The Research Quarterly

of the American Association for Health, Physical Education, and Recreation

ELMER D. MITCHELL, Ph.D., Editor

VOLUME 12 DECEMBER, 1941 NUMBER 4

Contents

Published in March, May, October, and December by the American Association for Health, Physical Education, and Recreation, 1201 Sixteenth Street, N.W., Washington, D.C. Subscription, $3.00 per year; single copies, $1.00.

Send subscriptions to: 1201 Sixteenth Street, N.W., Washington, D.C.

Editorial and Advertising Office: 311 Maynard Street, Ann Arbor, Michigan. Advertising rates on application.

A Fifty-nine Year Survey at Yale Reveals Freshmen are Becoming Younger, Heavier, and Taller

By William Deegan
Assistant, Physical Education Department
Yale University

THIS is a statistical study of the average age, weight, and height of over 32,000 Yale freshmen (all males). The results show that college freshmen are gradually becoming taller, heavier, and younger. This trend has been confirmed at other colleges throughout the country.

The information was compiled from gymnasium records, starting with the freshmen entering Yale College and the Sheffield Scientific School in the fall of 1883. A common freshman year was instituted in 1920 which combined these two groups. Up to 1920 examinations by the gymnasium staff were voluntary. We feel, however, that a sufficient number of students was recorded in each of these earlier years to constitute a reliable average, the only exception being in the group entering in the fall of 1918. This was the "war class," and, as most of the boys were in the Army, Navy, the R.O.T.C., or Naval Unit, few came to the gymnasium so that the results are not average for that class.

All ages were computed from date of birth to October 15, and almost all weights and heights were taken around October 1 of each year. All measurements taken after January 1 of a student's freshman year were excluded. Except for a three-year period (1926-1928), students were weighed stripped, but for these three years adequate allowance has been made for clothing. Heights were taken in bare feet.

The most striking fact to be found in the tables is the phenomenal increase in the percentage of six-footers. Here indeed is to be found an answer to those who assert that in the "good old days" Yale men were bigger and huskier than those attending college at present. The large percentage increase during this period of fifty-nine years certainly refutes such a statement, as do the results as to weight. It will be noticed that the first class shows the percentage of six-footers to be 4.3, while the last class shows the percentage to be 22.6. Last year's freshman class was the first to reach an average height of 70 inches, against 67.7 inches for the 1883 group. The average weight jumped from 137.7 pounds for the 1883 group to 151.1 pounds for this year's freshman class, and this despite the fact that the average age declined from 19 years to 18.3 years during the fifty-nine year period.

TABLE I

Entering Year	No. of Men in Class	Average Age (yrs.)	No. of Ages Computed	Average Weight (lbs.)	No. of Wts. Computed	Average Height (ins.)	No. of Hts. Computed	Men 6 Ft. and Over No.	Men 6 Ft. and Over Per Cent
1883	254	19.06	108	137.76	78	67.73	162	7	4.3
1884	219	18.98	139	136.92	116	67.83	139	9	6.4
1885	226	18.85	203	136.21	219	67.53	219	10	4.5
1886	267	18.84	252	133.49	255	67.49	255	11	4.3
1887	314	18.80	300	134.17	299	67.52	299	8	2.6
1888	326	18.85	298	134.74	306	67.64	306	10	3.2
1889	340	19.01	271	135.50	292	67.59	293	13	4.4
1890	394	18.89	302	134.96	305	67.73	307	12	3.9
1891	469	18.79	328	136.31	277	67.89	278	13	4.6
1892	508	19.11	226	137.66	237	68.01	237	20	8.4
1893	546	18.78	299	133.71	257	67.95	257	4	1.5
1894	588	18.78	381	136.84	378	67.96	381	27	7.1
1895	479	18.92	248	138.51	326	67.91	328	16	4.8
1896	527	18.91	342	138.86	339	68.10	339	18	5.3
1897	482	19.03	329	137.03	376	67.94	377	19	5.0
1898	526	19.10	420	135.42	414	67.98	416	18	4.3
1899	532	18.94	428	137.50	433	68.16	434	28	6.4
1900	546	19.02	400	136.98	405	68.09	405	23	5.6
1901	612	19.15	424	138.05	418	68.14	419	25	5.9
1902	609	18.96	407	138.08	406	68.33	406	29	7.1
1903	767	19.08	498	138.31	496	68.39	497	37	7.4
1904	738	18.88	415	136.14	408	68.11	408	23	5.6
1905	785	18.94	424	136.69	428	68.03	428	27	6.3
1906	756	18.85	430	138.64	460	67.99	461	28	6.0
1907	785	18.93	471	137.39	479	67.87	478	21	4.3
1908	785	19.08	444	138.89	459	68.20	459	25	5.4
1909	747	19.04	473	140.92	430	68.36	430	29	6.7
1910	782	19.12	477	139.34	506	68.49	506	36	7.1
1911	835	19.04	476	142.07	492	68.32	491	38	7.7
1912	849	19.11	545	140.90	501	68.39	501	34	6.7
1913	837	18.93	484	141.97	505	68.39	505	41	8.1
1914	874	19.04	481	141.30	478	68.62	478	47	9.8
1915	907	18.92	476	143.14	454	68.72	455	49	10.7
1916	792	19.12	637	142.01	706	68.39	707	65	9.2
1917	585	18.82	513	140.02	532	68.34	532	47	8.8
1918	809	18.55	90	121.19	18	64.81	18	None	
1919	781	19.10	687	142.00	659	68.39	660	67	10.1
1920	679	18.98	634	140.17	662	68.86	660	71	10.7
1921	860	18.83	756	142.67	826	69.14	856	117	13.7
1922	883	18.77	776	143.59	785	68.84	765	82	10.7
1923	860	18.71	770	141.53	798	69.04	750	99	13.2
1924	881	18.67	794	143.94	800	69.14	849	128	15.0
1925	863	18.77	810	142.77	847	68.96	848	120	14.1
1926	879	18.74	818	143.34	878	69.28	878	130	14.8
1927	887	18.61	807	143.79	877	.69.13	879	137	15.6
1928	894	18.66	847	142.26	861	69.30	880	135	15.3
1929	833	18.66	798	144.59	830	69.49	830	141	16.9
1930	850	18.68	799	145.39	832	69.39	832	152	18.2
1931	853	18.68	851	145.62	853	69.61	853	141	16.5
1932	883	18.61	879	147.14	880	69.66	880	144	16.3
1933	839	18.59	782	148.61	829	69.61	829	150	18.0
1934	781	18.50	716	148.05	778	69.52	777	132	16.9
1935	878	18.41	871	149.10	863	69.82	864	160	18.5
1936	846	18.45	843	148.97	842	69.72	842	158	18.7
1937	859	18.44	834	149.74	842	69.84	842	174	20.6

TABLE I (Continued)

Entering Year	No. of Men in Class	Average Age (yrs.)	No. of Ages Computed	Average Weight (lbs.)	No. of Wts. Computed	Average Height (ins.)	No. of Hts. Computed	Men 6 Ft. and Over No.	Men 6 Ft. and Over Per Cent
1938	855	18.41	851	152.08	850	69.88	848	165	19.4
1939	836	18.40	836	151.12	836	69.98	836	168	20.0
1940	859	18.42	859	151.63	856	70.06	856	188	21.9
1941	981	18.32	981	151.11	980	70.02	980	222	22.6
Total—(59yrs.)	41,017	18.77	32,038	143.04	32,552	68.90	32,705	4,048	12.4

For convenience in making comparison, Table II is presented to give the information in ten-year periods.

TABLE II

Average Age, Weight, and Height of Freshmen in Yale Computed in Ten-Year Periods

Period	Age (yrs.)	Weight (lbs.)	Height (ins.)	Per Cent Men 6 Ft. and Over
1883–1892	18.90	135.47	67.74	4.5
1893–1902	18.97	137.18	68.07	5.5
1903–1912	1902	139.00	68.23	6.4
1913–1922	18.94	141.88	68.65	10.4
1923–1932	18.68	144.36	69.31	15.7
1933–1941 (9 years)	18.44	150.09	69.83	19.8
Average for 59 years	18.77	143.04	68.90	12.4

Table III summarizes the first and the last ten-year periods.

TABLE III

Comparison of First and Last Ten-Year Periods

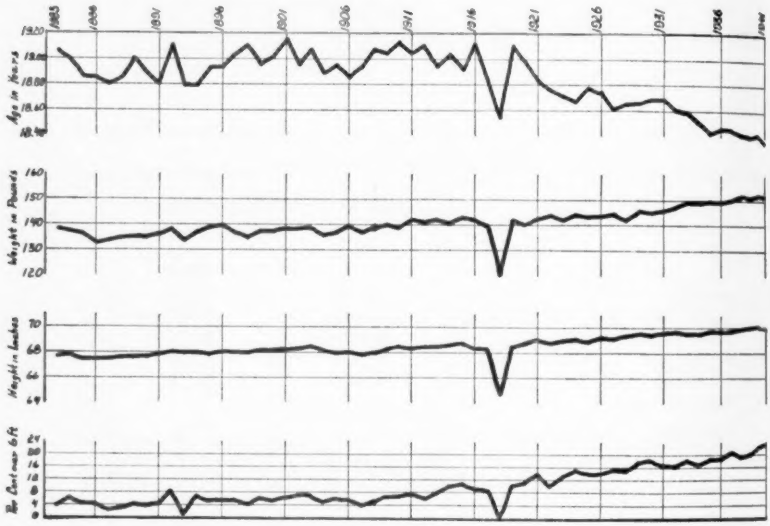
Period	Age (yrs.)	Weight (lbs.)	Height (ins.)	Per Cent Men 6 Ft. and Over
1883–1892	18.90	135.47	67.74	4.5
1932–1941	18.46	149.78	69.81	19.4

The first thirty years produced no great change in the average age, a four-pound increase in weight, and about one-half inch increase in height, whereas in the last twenty-nine years there has been a decrease in average age of about 7 months, an increase of 10 pounds in weight, and an increase of 1.7 inches in height. In the period since the first World War these trends have clearly accelerated.

It is interesting to speculate on the future. The average age already shows signs of levelling off since it has been 18.4 years for six

years; the average weight has increased about 2 pounds; and the average height has increased about .2 of an inch during this same six-year period. Certainly the downward age trend will not continue indefinitely, but who can say where the upward trend in weight and height will end? In view of the past, there are interesting possibilities here.

For the fifty-nine year period, the range in the age group runs from 14 years and 9 months for the youngest to 38 years and 5 months for the oldest. Honors for the heaviest freshman go to a 265 pounder, while Yale's smallest lightweight tipped the scales at exactly 75 pounds. The giant for this fifty-nine year period was 80.7 inches, while his midget Yale brother was 54.7 inches.



Naturally certain conclusions may be drawn from this study. We present the following casual theories, though just how accurate they may be still remains a matter of much speculation. At any rate, the development at Yale during this fifty-nine year period seems to agree with that shown by studies made in other colleges. That it is in conformity with a general national trend is indeed significant. Some investigators have attempted to show that economic and social position greatly influence growth. Such a theory might explain, in the light of other factors, the trends found at Yale, since the increase in size here exceeds in some instances that found in colleges whose students may be thought to have come from different groups. Since, on the other hand, Yale undergraduates come from all sections of the country, and since more than a third of them are partially self-supporting, it is unlikely that they represent social or economic groups markedly different from those represented in other colleges. Certainly the downward

trend in age has been influenced by the fact that boys now tend to start school earlier than their fathers did, plus the fact that the proportion of freshmen entering Yale from public schools has increased during this fifty-nine year period. That it is necessary for a boy, after four good years of high school, to spend a year or more in private school before entering college, is a belief fast disappearing.

Considering similar anthropological data of the past, it seems to be a fact that *homo sapiens* living in American society is growing heavier along with his increase in stature. To date no simple definite reason can be given for this condition, but such factors as preventive medicine, resulting in an increased immunity to contagious diseases; an improved knowledge of dietetic principles plus their application in practice; and generally higher standards of living account in some measure for this upward trend. It is certainly true that public schools show an increased enrollment over the past fifty years. This ever-widening range of education has been accompanied by well-rounded programs of physical training and health campaigns. Without doubt we can explain in part the present-day trends of age, weight, and height among entering college freshmen by the contributions of the physicians, nutritionists, public health workers, and educators.

Acknowledgement.—This study was made possible only by the splendid cooperation of the Yale Committee on Bursary Appointments through its Secretary, Mr. James M. Tompkins, who furnished several part-time bursary students to do some of the detailed work. Particular thanks are due Mr. Carleton Ashley, '41, a part-time bursary student assigned by the Committee. It was he who supervised the work of the other students for two years, and it was his unfailing interest and assistance in assembling and compiling the data herein presented that made this study possible.

An Anthropometric Study of Masculinity and Femininity of Body Build

By Aileen Carpenter
Teachers College of Kansas City
Kansas City, Missouri

IN SPITE of a most convincing lack of evidence to support the statement, writers continue to speak of the feminine build as being characterized by narrow shoulders, the masculine by broad shoulders. True, the literature has not presented an overwhelming amount of evidence to the contrary, but there is an even greater lack of evidence to support that point of view. Apparently these writers are quoting others who have, in turn, quoted others who, in the last analysis, have made statements based not on scientific evidence but on broad generalizations, most of them the results of optical illusions due to differences in cut of sleeves and the development of the deltoid muscles.

In a study published in 1938 [1*] based on the measurements of 100 college men and 100 college women, the differences between the width of shoulders of the men and those of the women, when reduced to a percentage of height, was found to be so very small that it was obvious that shoulder width was not a true differentiator between the sexes. This measurement illustrates the wide difference between fact and fancy in such anatomical sex differences as might differentiate anthropometrically between a person who was of a feminine or a masculine body build.

The present study deals only with anthropometric measurements as means of rating the masculinity or femininity of body build. The matter of masculinity or femininity of general attitude can be dismissed from a biological study of this kind, as such attitudes are probably principally due to a variety of environmental stimuli. The number of hormones, male or female, regularly produced by an individual has been suggested as a possible measure of masculinity or femininity. However, we are lacking in knowledge of the hormones, and a practical means of measuring the hormone production quantitatively is still a problem for the future.

This study was inaugurated to investigate the problem further with more subjects and more measurements, and to build a masculinity-femininity-of-body-build scale which could be readily used by others in problems involving this type of measurement. Eighteen anthropometric measurements of 389 college women were secured from data collected by Dr. Ruth Bass of the University of Texas and Dr. S. Lucille

* Superior figures refer to numbered Bibliography at end of article.

Hatlestad of the Kansas State Teachers College at Pittsburg, Kansas. The same 18 anthropometric measurements of 475 college men were secured from data collected by Dr. Nephi Jorgenson of Defiance College in Defiance, Ohio, and by Dr. W. W. Massey of the University of Oregon. The measurers had all been trained in the same laboratory and the results are comparable. The measurements obtained included: weight, height, and sitting height; girths of neck, chest, upperarm, forearm, thigh, and calf; width of shoulders, hips, knees, and elbows; measurements of subcutaneous fat of chest front, chest back, abdomen,

TABLE I

MEANS, STANDARD DEVIATIONS, CRITICAL RATIOS, AND PERCENTAGES OF OVERLAP OF THE INDICES OF BODY BUILD*

	Women†			Men		
	Mean	S.D.	Critical Ratio	Mean	S.D.	Per Cent Overlap
Hips	19.28	1.96	30.20	16.09	.78	12.20
Forearm	14.35	.89	— 7.95	14.84	.92	39.74
Knee	5.59	.335	5.88	5.466	.267	41.87
Breathing capacity	3.54	.176	—15.23	3.71	.15	29.77
Sitting height	54.06	1.69	18.29	52.18	1.24	25.62
Chest	45.88	3.03	—11.39	48.196	2.905	34.83
Thigh	34.37	2.86	22.05	30.44	2.25	22.06
Calf	21.76	1.62	12.78	20.41	1.45	33.02
Upperarm	15.93	1.72	2.76	15.90	1.39	49.60
Shoulders	22.00	1.01	2.46	22.19	1.20	46.50
Ponderal Index	3.12	.1094	18.18	2.99	.0907	27.43
Neck	19.25	1.01	—18.95	20.62	1.12	25.95
Elbow	3.49	.208	—24.24	3.83	.189	20.23

* Except for breathing capacity and the ponderal index, all indices are in terms of percentage of height. The breathing capacity and ponderal index are $100\sqrt[3]{\frac{\text{B.C.}}{\text{Hgt.}}}$ and $100\sqrt[3]{\frac{\text{Normal Wgt.}}{\text{Hgt.}}}$ respectively. For convenience in computing in this country, breathing capacity is in cubic inches and weight in pounds.

† Where the ratio is positive, the woman has the larger average index; where negative, the smaller.

and suprailiac; and breathing capacity of the lungs. Chest girth and hip width were first corrected for fat.[2] Optimum or "normal" weight for body build was computed for each individual.[3] The ponderal index (the cube root of the weight divided by height) was computed for each, using the individual's normal weight. A breathing capacity index was computed on the same volumetric basis, the cube root of breathing capacity divided by height. The remaining measurements were each divided by height to present them in terms of indices which represented percentage of the height of the individual.

The means and standard deviations of all the indices were then computed for the men and for the women. Critical ratios between the records of the men and women were computed for each of the measurements. The percentage of overlap was also computed. The means, standard deviations, critical ratios, and percentage of overlap are given in Table I.

We should like to call attention to one point which seems to be associated with many misconceptions in the statistical literature of physical education. A critical ratio may be very large, and yet the measurement may not be valuable as a distinguisher between the groups. We have in these data a critical ratio of 2.46 for the difference of shoulder width between the sexes. This would usually be interpreted to mean that there was a very significant difference between the groups. What it really means is that if we were to measure a number of other groups of the same sizes, it is almost certain that males (in this case) would have a slightly wider *average* width of shoulders. But in this case, the overlap between the groups is such that at the midpoint between the means (measured in standard deviations of each group), there is an overlapping of 46.5 per cent of the cases. In other words, this measurement is absolutely useless as a differentiator of masculinity and femininity of body build. This distinction between the meaning of

TABLE II

Intercorrelations of Eleven Indices of Body Build*

	Neck	Chest	Forea.	Thigh	Calf	Hips	Knee	Elbow	Sit. Hgt.	Br. Cap.
Pond. I.	.5805	.8699	.6448	.6178	.4933	.3756	.5607	.4891	.2543	.4826
	.6969	*.8722*	*.6968*	*.6809*	*.6295*	*.6624*	*.5709*	*.2934*	*.4261*	*.4614*
Neck		.5223	.6099	.4897	.3995	.1928	.3765	.4531	.2833	.3821
		.3977	*.7296*	*.6226*	*.5704*	*.3858*	*.4639*	*.3718*	*.3581*	*.3686*
Chest			.5865	.5604	.3658	.0898	.3507	.4006	.1592	.4683
			.6149	*.5926*	*.4136*	*.4693*	*.3962*	*.1196*	*.3158*	*.4302*
Forearm				.6794	.5680	.1926	.4563	.5446	.1885	.3813
				.7296	*.6981*	*.2834*	*.6807*	*.5800*	*.3157*	*.2917*
Thigh					.6335	.1714	.5351	.3715	.1618	.5324
					.6066	*.3144*	*.5942*	*.4208*	*.2619*	*.3377*
Calf						.4910	.4485	.3412	.1647	.2995
						.3499	*.5941*	*.3359*	*.1887*	*.3585*
Hips							.2568	.2285	.1001	.1113
							.3079	*—.0796*	*.4213*	*.3277*
Knee								.4163	.2145	.1935
								.5857	*.1845*	*.2048*
Elbow									.1798	.2119
									.0544	*.0846*
Sitting Height										.1874
										.3224

* Where the men's and women's records are combined in these tables, the men's are in roman type and the women's in italics.

critical ratio and the value of the measurement should be kept in mind. In like manner, a correlation of .10 with a probable error of .01 is "significant" statistically; that is, it is not just due to chance. But as a basis for prediction, it is practically as worthless as one of .00.

On the basis of these results the upperarm and shoulder indices were eliminated from further study. It is interesting to note that here again, with four times as many subjects as were used in the first study,

shoulders are shown to be relatively insignificant as a differentiator between the sexes.

The eleven remaining indices were intercorrelated separately for men and women. Table II gives the resulting coefficients of correlation.

Biserial correlations were then computed for the eleven indices. The formula of Richardson and Stalnaker [4] was used since it is proposed as a method which can be used with non-normal data. The usual method can be used only on data that can be validly assumed to have a normal distribution of the dichotomous variable. When the indices for both men and women were tabulated together for any one measurement, the curve is platykurtic or even bimodal rather than normal. The biserial correlation thus computed gives the correlation between that index and the masculinity or femininity of body build. The biserial correlations are given in Table III.

TABLE III

Biserial Correlations of Eleven Indices of Body Build

Ponderal index	.8664	Thigh	.6073
Breathing capacity	—.4679	Calf	.4272
Knee	.1995	Forearm	—.2751
Sitting height	.5371	Elbow	—.6323
Chest	—.3642	Hips	.7366
Neck	—.5324		

From these biserials it seems probable that the forearm and the knee merit no further consideration and that the chest girth may also be dropped from further study in view of the large number of variables with larger correlations.

The eight remaining indices were then intercorrelated with the data for the men and women combined. The resulting coefficients of correlation are given in Table IV.

TABLE IV

Intercorrelations of Eight Indices of Body Build, Men and Women Combined

	Thigh	Elbow	Hips	Sit. Hgt.	Neck	Br. Cap.	Calf
Pond. Index	.7605	—.8067	.7009	.5268	.1577	.1042	.5954
Thigh		—.1474	.6251	.4608	.0283	—.0461	.6948
Elbow			—.4705	—.2353	.5964	.4008	.1159
Hips				.5806	—.2384	—.2725	.3605
Sitting height					—.0488	—.0125	.3101
Neck						.5173	.2553
Breathing capacity							.1525

Using the biserial *r*'s as the criterion of masculinity or femininity of body build, multiple correlations were computed using various combinations of the indices. The resulting multiples are given in Table V.

TABLE V

MULTIPLE CORRELATIONS—MEN AND WOMEN COMBINED

0. Biserial r	R 0.123456	.9091
1. Neck	R 0.12345	.8947
2. Hips	R 0.1234	.8539
3. Sitting height	R 0.123	.8420
4. Breathing capacity	R 0.12	.8231
5. Thigh	R 0.1234567	.9260
6. Elbow	R 0.12356	.8969
7. Calf	R 0.1256	.8866
8. Ponderal index	R 0.125	.8615
	R 0.25	.7602
	R 0.12567	.9167
	R 0.12567/8	.9781

The R of hips, neck, thigh, elbow, and calf, .9167, is decidedly the best of the combinations of five, is higher than one group of six, and is almost as high as the other group of six. Considering these figures and the sizes of the Betas involved, this combination of five, hips, neck, thigh, elbow, and calf, was chosen as the best battery of measurements from which to determine the masculinity or femininity of body build. Furthermore, the R 0.12567/8, with the biserial correlation as criterion and with the ponderal index held constant,[5] is .9781, which gives further evidence that these five may justifiably be used in combination as an index of type of body build.

A regression equation based on the multiple R gave the following weightings for the determination of body build: 134.48 hips/height +47.85 thigh/height—301.40 neck/height—1098.85 elbow/height + 221.20 calf/height + 65.85. A rating of 50 would imply neither decidedly masculine nor feminine type of build, but rather a build very much between the two. Ratings below 50 indicate increasingly masculine type of build while ratings above 50 imply an increasingly feminine type of build.

The masculinity-femininity ratings of the 475 men and 389 women used in this study were computed and correlated with the ponderal indices, sexes done separately. The resulting r of —.0356 for men indicates that the ponderal index has practically no influence on the masculinity or femininity of body build of the men. The r of .4221 for the women would seem to indicate that unlike the scale for men, the scale for women tends to rate those of stocky build as more feminine, those of slender build as more masculine purely because of build alone. In order to correct for this the following formula for the prediction of masculinity-femininity of body build in women was computed: normal masculinity-femininity in women = 20.03 ponderal index — 3.99. Table VI is included for use in making this prediction. This formula predicts only the approximate norm for the individual. In order to determine the correct masculinity-femininity score the rating for each woman must be computed according to the scale previously presented. Then

her norm is computed according to her ponderal index using the above formula. (See Table VI.) Subtract the norm from the individual's computed masculinity-femininity score. Then add this resultant algebraically to the *mean* masculinity-femininity score for all women, 58.51. The resulting score is the masculinity-femininity rating for that individual.

TABLE VI

TABLE FOR USE IN COMPUTING THE NORMS FOR MASCULINITY-FEMININITY INDEX FOR WOMEN

Masculinity-Femininity Index = 20.03 ponderal index — 3.99

	0	1 (6)	2 (7)	3 (8)	4 (9)
3.60	68.12	68.32	68.52	68.72	68.92
3.55	67.12	67.32	67.52	67.72	67.92
3.50	66.12	66.32	66.52	66.72	66.92
3.45	65.11	65.32	65.52	65.72	65.92
3.40	64.11	64.31	64.51	64.71	64.91
3.35	63.11	63.31	63.51	63.71	63.91
3.30	62.11	62.31	62.51	62.71	62.91
3.25	61.11	61.31	61.51	61.71	61.91
3.20	60.11	60.31	60.51	60.71	60.91
3.15	59.10	59.30	59.51	59.71	59.91
3.10	58.10	58.30	58.50	58.70	58.90
3.05	57.10	57.30	57.50	57.70	57.90
3.00	56.10	56.30	56.50	56.70	56.90
2.95	55.10	55.30	55.50	55.70	55.90
2.90	54.10	54.30	54.50	54.70	54.90
2.85	53.10	53.30	53.50	53.70	53.90
2.80	52.09	52.29	52.49	52.69	52.89
2.75	51.09	51.29	51.49	51.69	51.89
2.70	50.09	50.29	50.49	50.69	50.89
2.65	49.09	49.29	49.49	49.69	49.89
2.60	39.09	39.29	39.49	39.69	39.89

Figure I shows diagrammatically how this procedure actually corrects the masculinity-femininity rating which for women is otherwise overly influenced by ponderal index. The slope of the line X–X_1 is determined by the application of the formula described in the preceding paragraph. For example, an individual having a ponderal index of 3.12, average for women, would have a norm of 58.51, average masculinity-femininity rating for all women. Her spot on the diagram is marked with an 0.1. Another individual having a ponderal index of 3.35 would have a norm of 63.11. Further examples can be obtained from Table VI. It will be seen that all norms for given ponderal indices fall on the line X–X_1.

Susan, who has a ponderal index of 3.2, has a computed masculinity-femininity rating of 63.31 (S_1 on Figure I). Her norm is 60.11 (See Table VI) which, when subtracted from her computed score, gives a resultant of + 3.20. This resultant is added to the average for women, 58.51, thus giving Susan a masculinity-femininity rating of 67.71 (S_2 on Figure I). It is important to note that both of the points, S_1 and S_2, are

the same distance from the line X–X_1 and both are on the more feminine side of the line. In other words, Susan is more feminine than the average but not so much more feminine as her computed rating, which is unduly influenced by her stocky build, would seem to indicate.

Grace, who has a ponderal index of 3.46, has a computed rating of 63.69 (G_1 on Figure I). Her norm is 65.31 (see Table VI) which, when subtracted from her computed score, gives a resultant of — 1.62. This resultant is added algebraically to the average for women, 58.51, giving Grace a masculinity-femininity rate of 56.89 (G_2 in Figure I). As is

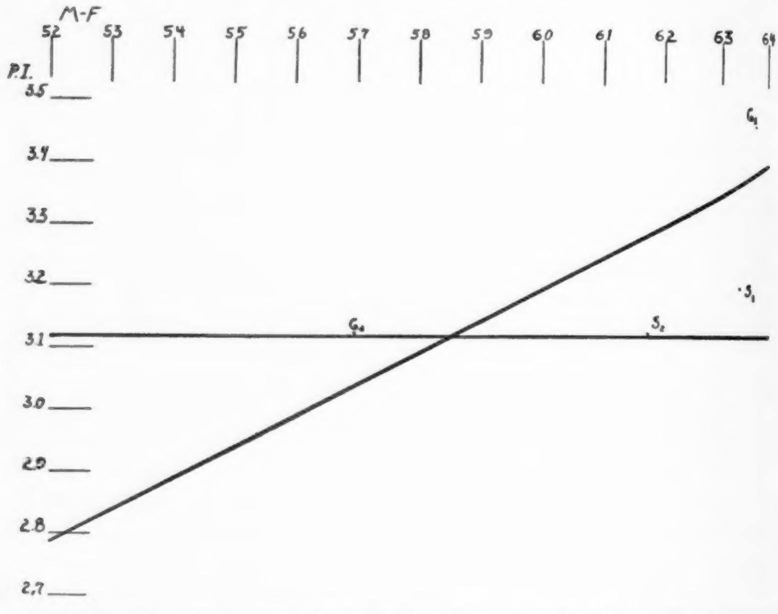


FIG. I. Diagram showing the method of correction of the computed masculinity-femininity rating of women.

true in Susan's case, both points, G_1 and G_2, are equally distant from the line X–X_1. Grace, of extremely stocky build, is really less feminine than average, as is shown in Figure I where she is on the less feminine side of the line.

Table VII, based on the standard deviation of estimate which is 4.707, is included for use in comparing individual records with established standards. Approximately 50 per cent of all the women will be more feminine than 58.51, 50 per cent more masculine, 15 per cent more feminine than 63.21, 15 per cent more masculine than 53.81 and so on.

This scale for rating the masculinity or femininity of body build is offered as a tool for further research. Individuals interested in the

study of masculinity or femininity of general social attitudes may find it useful as an anthropometric measure of the body builds of the subjects. When a means of measuring hormone production quantitatively is made available, numerous researches of relative masculinity or femininity will be stimulated to which this measure of body build may be a contributing factor. Anthropometric studies having to do with configuration of bones, hair distribution, or heredity may find this scale a useful supplementary implement. It should, also, be especially useful in studies involving body build in relation to athletic performance, and in analyzing the characteristics of body build of outstanding performers.

TABLE VII
SUGGESTED STANDARDS FOR COMPARISON OF MASCULINITY-FEMININITY RATINGS FOR WOMEN

Masculinity-Femininity Rating	Percentage Expected
72.6	.13 per cent are more feminine
67.9	2.28 per cent are more feminine
63.21	15.87 per cent are more feminine
58.51	50. per cent are more feminine *or* more masculine than this rating
53.81	15.87 per cent are more masculine
49.1	2.28 per cent are more masculine
44.4	.13 per cent are more masculine

BIBLIOGRAPHY

1. Carpenter, Aileen. "Strength, Power, and 'Femininity' as Factors Influencing the Athletic Performance of College Women," RESEARCH QUARTERLY, 9: 2 (May 1938).
2. McCloy, C. H. *Appraising Physical Status: The Selection of Measurements* (Iowa City, Iowa: University of Iowa, 1936).
3. McCloy, C. H. *Appraising Physical Status: Methods and Norms* (Iowa City, Iowa: University of Iowa, 1938).
4. Richardson, M. W., and J. M. Stalnaker. "A Note on the Use of Biserial *r* in Test Research," *Journal of General Psychology*, 8 (April 1933) 463-465.
5. Tappan, M. "On Partial Multiple Correlation Coefficients in a Universe of Manifold Characteristics," *Biometrika*, 19 (1927) 39.

The Attitude of College Women Toward Physical Activity as a Means of Recreation

By Beverly Young Moore
University of California
Los Angeles, California

THE experience of many people in working with intramural programs of physical education for college women has shown that there is a decided lack of participation on the part of a great percentage of students. At the University of California (Los Angeles) it was estimated at one time that less than one-eighth of the girls enrolled were taking advantage of the varied activities offered for recreation by the physical education department. This situation and others similar, considering abundant facilities and well-organized programs, have been explained by saying that most girls have no interest in physical activity or that they are receiving in other places the amount of physical activity they desire.

Since neither of these explanations seemed adequate, this study attempted to evaluate the actual attitude of college women and, if they were not participating in the amount of physical activity they desire, to determine what they felt to be the underlying causes for this lack of participation.

Gloss,[1]* in a survey of studies comparing actual and desired participation in recreational activities, found swimming, tennis, and dancing mentioned most often in both cases. It was also found by Toogood[2] that more girls participate in indoor forms of recreation but express a desire for more active, outdoor sports and that activities desired by most women may be adapted to use in mixed recreation. Little mention has been made, however, concerning the questions of psychological testing of attitude, the actual amount of participation of college women, or its relation to desire for participation.

The most important reasons for actual disliking of physical activity, as reported by Alden,[3] are inconvenience of dressing and undressing, and failure of secondary schools to develop elementary physical skills beyond the novice stage. In the present study these reasons for disliking physical education have been evaluated in the interviews to discover how important the girls feel them to be as factors in deterring actual participation in recreational activities.

* Superior figures refer to numbered Bibliography at end of article.

METHOD OF PROCEDURE

To determine the actual attitude of college women toward physical activity, the following questions were raised for study:

1. How favorable is this attitude as found by attitude scales?

2. How much time do college women spend in physical activity as a means of recreation?

3. Is this as much as they actually wish to spend? If not, to what causes may this lack of participation be attributed?

4. How important is physical activity as a part of students' recreational time?

5. In what type of activity do they engage most?

6. At what time in a girl's life is her participation in activity greatest? What are the reasons for this?

7. Do girls lose any of their desire for physical activity after they leave high school?

A 10 per cent sampling was taken of the junior and senior women in each major department at the University of California (Los Angeles). This included 179 students. The method used in choosing these students followed the general procedure of the Gallup poll for public opinion.[4] The particular cross-section used in this study, year in school and major department, is a combination of the distinct divisions of the school population, small enough to be critical and large enough for use in sampling. By this classification any upper division student could have been included.

The general method of study was twofold. First, a psychophysical measure was employed. Second, these findings were evaluated by the subjective answers and ratings of the individuals through interviews. The score obtained from the former is an objective foundation for analysis of attitude. This score may also be used in comparing groups in later study. Through the second approach the importance of the factors believed to be included in this attitude is evaluated by personal opinion.

In order to discover basic attitudes, practices, and causes for them, an interview technique was felt to be the most reliable method to use even though the number of individuals was necessarily smaller than that which could have been reached by means of a questionnaire. The better understanding and added data, however, which can be obtained by this method more than compensate for the lack of numbers.

The standardized measure used to test attitude toward physical activity was *Form A* of the Bues-Remmers' scale to measure attitude toward any practice.[5] This scale is one of a group of generalized scales developed by Remmers and his associates which is based on the Thurstone[6] technique. This scale was checked by the students during the interview. In using the scale for this study, the following heading was employed:

Following is a list of statements about *participation in physical activity* (games, dancing, swimming, skating, etc.) as a means of recreation.

The individual using the scale related the general statements to this heading. The directions as given by Kelley [7] were related to this scale as follows:

Place a plus (+) before each statement with which you agree with reference to your participation in physical activity.

Statement 17 in *Form B* was substituted for statement 17 in *Form A* of the scale as the wording might have been misinterpreted in reference to this topic.

The interviews were augmented by a basic questionnaire used as a guide for the interviewer.* In no case was the questionnaire put into the hands of the students. In so far as possible the questions were allowed to rise out of discussions rather than being given merely as questions and answers.

The items subjectively rated as to degree, such as, "To what extent do you *like* to participate in physical activity," were scored on an arbitrary five point scale as follows:

5	4	3	2	1
great deal	quite a bit	some	a little	not at all

The interviews were made wherever students could be found on campus and in living organizations. An attempt was made to vary the locations in order to eliminate any typing of results which might come from interviewing just girls encountered at the library or just those at the Co-op, for example. Each interview took approximately seven minutes although many discussions lasted much longer.

As a time-saving device, it was found that two or three girls could be interviewed at the same time with no noticeable duplication of results. On the whole, these group interviews seemed even more satisfactory than individual ones because the girls would often discuss the subject among themselves, eliminating the possible influence of the interviewer.

SUMMARY AND CONCLUSIONS

The results of this study show a highly favorable general attitude among these college women toward physical activity, the attitude scale resulting in a median score of 8.89 from a possible eleven points which is the equivalent of an 89th percentile score. It was found that the median score for actual *liking to participate* in physical activity as determined by a 5-point scale was 3.91 which is in the range of "quite a bit." This is equal to the 78th percentile score.

* See Appendix.

In contrast to this finding is the fact that the average amount of time spent in participation in this type of activity is low. Approximately 50 per cent of the girls participate less than four hours a week. The number of girls spending no time at all is 4.4 per cent of the total while 8.8 per cent spend no more than one hour, 34 per cent two hours, and 17.7 per cent three hours. The majority of these girls, however, wish to spend more time than they are spending in activity but find it impossible for the following reasons:

1. *Lack of time*, for the most part because of time needed for *study*, is considered the most important reason for the small amount of participation in physical activity.

2. *Lack of play companions* and *outside work* were given as the next most important causes.

3. *Commuting, lack of finances*, and *health* are felt by the group studied to be of minor importance.

4. Contrary to common opinion, neither the *damage done to appearance* by activity, showering, and dressing nor *lack of skill* are of particular importance in deterring participation in physical activity, the median score on a 5-point scale being 1.14 and 1.82 respectively, or 28.2 and 36.4 percentile ranks.

It may be pointed out that these college women feel that physical activity has a definite place in their recreational time but that this recreational time is limited. Also the amount of time they do have is often too short or comes at a period during the day not conducive to physical activity.

This study shows, as have others, that the interest and participation of college women are definitely more strongly related to individual sports activities and dancing than to team sports.

These girls participated more in physical activity in the secondary school than in college but this participation is felt to have resulted from more time, better organization, and more close friends rather than a stronger desire to seek sport activity at that time. In many instances the desire to participate in activity was increased after leaving high school and, in general, interest in competitive and team sports was lessened while more emphasis was given to individual and less competitive activities.

These findings suggest a need in women's physical education departments for organized recreational activities at varied times and the offering of many individual and corecreational activities. In an attempt to answer this need, this university and others are organizing corecreational and interest groups on a noncompetitive basis and offering evening recreationals of dancing and games.

Since, however, lack of time for recreation has been found as the most important cause for failure to participate in activity, it should be the responsibility of university authorities in giving advice regarding

academic programs to aid the student in definite planning for recreational time. The importance of provision for this time should be realized by the institution as part of its educational responsibility and cease to be left to chance after the required program has been scheduled.

In order to find the possible variations in attitude arising from the situation studied, it is further recommended that this type of investigation be carried on in an institution where most of the students live in groups near the school facilities.

APPENDIX

Interview Questionnaire

1. In the time you have for recreation, what type of physical activity do you engage in most frequently?

A. Social activity (dancing, social games).
B. Organized team sports (basketball, volleyball, hockey).
C. Small team or individual sports (tennis, swimming, ice skating).
D. Any other.

2. How much time a week, on an average, do you spend in physical activity as a part of your recreation? (Include physical education class work if you feel it to be a part of your recreation.)

A. Five hours or more.
B. Four hours.
C. Three hours.
D. Two hours.
E. One hour.
F. None.

3. Do you feel that this is as much time as you would like to spend?

A. Yes.
B. No.

If not, what are your main reasons for not spending more?

a) Time.
  1) Studies.
  2) Travel.
  3) Work.
  4) Activities.
  5) Other.
b) Health.
c) Lack of skill.
d) Inertia.
e) No facilities available.
f) No one with whom to play.
g) Lack of finances.
h) Other.

4. At what time in your life did you particicpate most in physical activity?

A. College.
B. Secondary school.
C. Elementary school.

To what do you attribute this interest?

a) Program, type of life, fewer diversions.
b) Belonged to an organized group.
c) More facilities, or satisfied with less equipment.
d) Other.

5. Do you feel that you have lost any of your actual desire for physical activity since leaving high school?

A. Yes.
B. No.

6. To what extent do you *like to participate* in sports activities and dancing?

5	4	3	2	1
a great deal	quite a bit	some	a little	not at all

7. To what extent are you deterred from actual participation by the inconvenience of dressing, showering, and getting generally "mussed up"?

5	4	3	2	1
a great deal	quite a bit	some	a little	not at all

8. To what extent does lack of skill deter you from actual participation?

5	4	3	2	1
a great deal	quite a bit	some	a little	not at all

9. To what extent does lack of time deter you from participation in sports?

5	4	3	2	1
a great deal	quite a bit	some	a little	not at all

10. How important do you consider sports at the present time as part of your recreational program?

5	4	3	2	1
a great deal	quite a bit	some	a little	not at all

BIBLIOGRAPHY

1. Gloss, G. M. "What People Do in Their Spare Time," RESEARCH QUARTERLY, 9:2 (May 1938) 138–42.
2. Toogood, Ruth. "A Survey of Recreational Interests and Pursuits of College Women," RESEARCH QUARTERLY, 10:3 (October 1939) 90–100.
3. Alden, Mabel Avis. "The Factors in Required Physical Education Programs that Are Least Attractive to the College Girl," RESEARCH QUARTERLY, 3:4 (Dec. 1932) 97–107.
4. Gallup, George, and Claude Robinson. "American Institute of Public Opinion—Surveys—1935–38," *Public Opinion Quarterly*, 2 (July 1938) 373–98.
5. Bues, Harry W. "The Construction and Validation of a Scale to Measure Attitude toward Any Practice, "*Bulletin of Purdue University*, 35, *Studies in Higher Education*, 26 (Dec. 1934) 64–7.
6. Thurstone, L. L., and E. J. Chave. *The Measurement of Attitude* (Chicago, University of Chicago Press, 1937) pp. xii–97.
7. Kelley, Ida B. "The Construction and Evaluation of a Scale to Measure Attitude toward Any Institution," *Bulletin of Purdue University*, 35, *Studies in Higher Education*, 26 (Dec. 1934) 18–35.

A Survey of Safety Conditions of Buildings and Grounds in Secondary Schools

By Leslie W. Irwin
Director of Health and Physical Education
The Laboratory Schools
The University of Chicago

and Ross Stephens
Department of Physical Education
Washington High School
Washington, Iowa

When consideration is given to the appalling number of deaths and disabling injuries from accidents to both children and adults it becomes readily apparent that there is a need for definite action on the part of school people in the education and protection of the child.

During the year 1940 there were 96,500 deaths from accidents in the United States.[1] Approximately 330,000 persons were permanently disabled and 9,100,000 temporarily disabled. The estimated cost of the accidents in 1940 exceeded $3,500,000,000.

Of the 96,500 deaths from accidents in 1940 approximately 6,600 were children between five and fourteen years of age and 12,700 were in the age group from fifteen to twenty-four years.

Forty-four per cent of the accidents to school children happen at school. Of the accidents that happen at school, approximately two-thirds occur in the gymnasium and on the playground. Of the accidents occurring in school buildings, approximately 35 per cent happen in gymnasiums; 19 per cent in the school shops; 13 per cent in classrooms; and 17 per cent in other places in the school building.

In protecting the school child from the modern-day devastating accident situation it is necessary that educators give particular attention to safety conditions of the school plant and facilities. With the recent rapid growth in emphasis on safety, many school administrators throughout the country are giving greater attention to the removal of hazards and to the protection of the school child.

In order to determine the existing safety conditions of school plants and facilities, personal visitations were made to 40 representative high schools in the middlewest. The enrollment in these schools ranges from 40 to 1,285. The average enrollment is 284. The school sites range in size from two to 20 acres. The average school site is approximately

1 The National Safety Council, *Accident Facts*, 1941 Edition, pp. 3, 58, 59, 108.

5.75 acres. The school sites include athletic fields, some of which are a considerable distance from the school buildings. The dates of construction of the school buildings range from the year 1884 to 1940.

A safety check list was used in the personal visitations in order to assure uniform methods of checking each school and to be sure that there were no omissions of important safety points. Permission for the inspection of the school plant in each case was secured from the superintendent, principal, or board of education in case of absence of the administrators.

SAFETY CONDITIONS OF SCHOOL GROUNDS

The number of acres of play area in the 40 high schools ranges from one to 10 acres, with an average of 3.8 acres. However, 14, or 35 per cent, of the forty schools have less than one acre of play area directly adjacent to the school building. The 14 schools have athletic fields ranging from 2.5 acres to 10 acres. The athletic fields are such distances from the school buildings that it is not practical for the schools to use them for physical activities during the course of the regular school day. Although some of the schools have sufficient acreage for physical activities, the location of their athletic fields so far from the school leaves insufficient play space in the immediate vicinity of the school building. One superintendent, recognizing the hazards of conducting physical activities with limited space and facilities, does not attempt to sponsor a physical education program.

In 38 per cent of the schools investigated, there is not sufficient level space in the immediate vicinity of the school for a regulation softball diamond. The proximity of windows, trees, flag poles, cement slabs, rough ground, and streets provides a hazard in the majority of these cases.

In 43 per cent of the 40 schools the surfacing of the play area is sod; in 38 per cent there is a combination of sod and dirt. The following shows the types of surfacing of the playgrounds:

	Number	Per Cent
Sod	17	43
Sod and dirt	15	38
Dirt and cinders	3	8
Dirt	3	8
Sod and cinders	1	3
Dirt and crushed stone	1	3

It should be noted that in some cases the surface of the playground is partly cinders and stone. This type of surfacing is hazardous for school children.

Table I shows the results of inspections pertaining to certain safety conditions of the school grounds. Sixty-three per cent of the play surfaces are comparatively free from stones, cinders, and other materials

of a hazardous nature. Seventy-three per cent of the play areas are free from obstructions such as trees and playground apparatus. In 28 per cent the surface is not smooth. The irregularity of the surface is such as to be a hazard. In 33 per cent of the cases school grounds are not level with the sidewalks. In 10 per cent the sidewalks are in poor repair. Thirty-eight, or 95 per cent, of the school grounds seem to be properly drained. In 5 per cent there is evidence of poor drainage of play areas. Some of the school grounds were badly eroded because of the irregularity of the ground.

TABLE I

SAFETY CONDITIONS OF SCHOOL GROUNDS IN THE FORTY SCHOOLS

Conditions	Yes		No	
	No.	Per Cent	No.	Per Cent
Are play surfaces entirely free from stones and materials of a hazardous nature?.........	25	63	15	38
Are play areas free from obstructions such as trees and playground equipment?........	29	73	11	28
Are all play areas smooth?..................	29	73	11	28
Are surfaces of grounds level with sidewalks?	27	68	13	33
Are play areas enclosed by high wire fences on sides bordering streets?..................	8	20	32	80
Are schoolgrounds properly drained?.........	38	95	2	5
*Are windows next to playgrounds protected by heavy screens?..........................	15	48	16	52
Are sidewalks in good repair?................	36	90	4	10
Are conspicuous notices of regulations, possible hazards and precautions posted?.........	3	8	37	93
Is there evidence of playground equipment being in a hazardous condition?...........	0	0	40	100

* In 9, or 23 per cent, of the 40 schools the playground is a sufficient distance from the building so that the screening of basement windows is unnecessary.

In 80 per cent of the schools the play areas are not enclosed by high wire fences. Twenty-three per cent of the schools have playgrounds a sufficient distance from the school so that the screening of basement windows is unnecessary. In 52 per cent of the schools the playground is in such proximity to the building that there is need for the screening of basement windows. Forty-eight per cent of the schools in which there is a need for screening do not have the basement windows screened. There is no evidence of playground equipment being in a hazardous condition. School officials and custodians, however, are uncertain about the intervals at which playground equipment is checked for safety. Eight per cent report that equipment is checked daily; 35 per cent state that is checked weekly; 50 per cent say that it is checked monthly; and 8 per cent state that the equipment is checked yearly.

GYMNASIUM FACILITIES AND EQUIPMENT

Ventilation in the dressing rooms of 75 per cent of the schools is dependent on windows; 23 per cent use a fan system and 3 per cent have no means of ventilation whatever. The majority of school officials are uncertain about the frequency of inspection for defects of athletic equipment. In 33 per cent of the schools it is estimated that there is weekly inspection of athletic equipment and in 67 per cent it is estimated that the equipment is inspected monthly. Table II shows the results of the inspection regarding gymnasium facilities and equipment.

TABLE II
GYMNASIUM FACILITIES AND EQUIPMENT OF THE FORTY SCHOOLS

Conditions	Yes No.	Yes Per Cent	No. No.	No. Per Cent
Are foot tubs used for the prevention of ringworm?	27	68	13	33
Do radiators project hazardously near playing area?	5	13	35	88
Are all hazardous projections near playing areas padded?	15	38	25	63
Are mats provided on end walls or on any posts near the play area?	21	53	19	48
Are gymnasium windows, lighting fixtures, clocks, and thermometers screened or otherwise protected from accidental breakage?	35	88	5	13
Are the floors free from splinters?	39	98	1	3
Are the floors slippery?	3	8	37	93
Is the gymnasium in conjunction with the school building?	32	80	8	20
Is hot water controlled by a central mixing valve?	3	8	37	93
Is the lighting system sufficient to light all parts of the shower room?	36	90	4	10

In 13 per cent of the forty schools radiators project hazardously near the playing areas in the gymnasium. Many of the schools have a combination gymnasium and auditorium in which the stage projects near the playing area. Unpadded projections were found in 38 per cent of the schools. Posts and walls near the playing area are padded in 53 per cent of the gymnasiums; in 38 per cent this precaution is not taken. The proximity of seats and spectator standing areas to the playing area often presents a hazard not only to players but to spectators. In one school the spectators' benches project 6 inches into the playing area. In another school the spectator area is 15 feet from the playing space. In this case, however, an open orchestra pit approximately 5 feet deep and 6 feet wide is between the two areas. The average distance between the playing areas and the spectator areas in 36 schools is 2.5 feet. In 15 per cent of the forty schools the spectators' seats are

in the balcony. In the cases where the spectator seats are in the balcony, however, the play areas extend to the walls.

In 88 per cent of the 40 schools, windows, lighting fixtures, clocks, and thermometers are adequately screened. These fixtures are not sufficiently protected in 13 per cent of the schools. In 93 per cent of the schools the gymnasium floors are of hard wood and in good condition. In one case the gymnasium floor is chipped and dangerous from the standpoint of splinters. Eight per cent of the gymnasium floors are slippery enough to be considered hazardous. Floor oil and dancing wax are responsible for the slippery condition of the floors inspected.

PROVISION FOR FIRST AID IN THE SCHOOLS

Table III shows the place or places where first-aid materials are located in the schools. Twenty-three per cent of the schools have special rooms, referred to as clinics, where first-aid materials are located. In other schools Junior Red Cross students are present at all times during the school day. In two schools visiting nurses are on duty two days each week; in three schools nurses are present one day each week; and in one school two nurses are on duty at all times during the school day.

TABLE III

Places Where First-aid Materials are Kept

Places	Number of Schools	Per Cent
Coaches' offices	40	100
Office of the superintendent	23	58
School shop	14	35
Home economics department	13	33
Clinic	9	23
Science laboratory	8	20
Office of principal	3	8
Homerooms	1	3
Corridors	1	3
Gymnasium	1	3
Normal training department	1	3

BUILDING CONSTRUCTION

Twenty-five per cent of the schools do not have electric light switches at both the top and the bottom of stairways. In 8 per cent of the schools safety tread material is used on the stairs. Ninety-three per cent of the schools have not taken this precaution. In 80 per cent of the cases there are hand rails on both sides of the stairways. In 20 per cent, hand rails are found only on one side. It is usually recommended that the bottom step in a stairway be painted white. This recommendation has not been followed out in any of the schools.

Highly polished floors are a hazard in the corridors in 15 per cent of the schools inspected. Of the 70 per cent of the schools that have lockers in the corridors, 22, or 79 per cent, are built in or fastened

securely to the walls. Twenty-two per cent are not securely fastened to the walls. In all schools display cases, bulletin boards, and other articles of furniture are placed so that they will not hamper the students; consequently, there seems to be no hazard presented by such materials.

Table IV reveals that in 10 per cent of the schools there is evidence of loose plastering in the classrooms. In all the schools surveyed the classroom doors open outward. In 8 per cent of the schools light is

TABLE IV

SAFETY CONDITION OF CLASSROOMS

Phases Inspected	Yes		No	
	No.	Per Cent	No.	Per Cent
Is there evidence of loose plaster on ceilings and walls?	4	10	36	90
Do all doors open outward?	40	100	0	0
Is additional light admitted through a skylight?	3	8	37	93

admitted to some of the classrooms through skylights. In one school there is a modern system of fluorescent light. A check was made to determine the number of schools in which there is shatter-proof glass in entrance doors. Only one school has wire inset in the glass of entrance doors. Ninety-eight per cent have double and triple strength glass in the entrance doors.

Ninety-three per cent of the 40 buildings checked seem to be well maintained. In 8 per cent there is evidence of poor maintenance. Table V shows that in 48 per cent of the schools there is no provision for the mechanical circulation of the air. Skylights are used for additional lighting other than windows in classrooms in 25 per cent of the schools.

TABLE V

VENTILATING, LIGHTING, AND HEATING SYSTEMS

Questions	Yes		No	
	No.	Per Cent	No.	Per Cent
Is the building provided with a ventilating system?	21	53	19	48
Does the heating system provide an even and uniform heat?	38	95	2	5
Are skylights used for additional light other than windows in classrooms?	10	25	30	75

PROVISION FOR TRAFFIC SAFETY

Table VI shows that 48 per cent of the 40 schools have made provisions to regulate the parking of automobiles. Thirty-eight per cent have made arrangements to designate "School Crossings" during the peak hours of school traffic. This is accomplished by means of a school patrol or by using movable stop signs. In 63 per cent of the schools no arrangements have been made to designate school crossings. In 40 per

cent of the schools provisions have been made for the parking of bicycles where they will not interfere with traffic of any type. Eight per cent of the 40 schools sponsor junior safety councils.

TABLE VI

PROVISION FOR TRAFFIC SAFETY

Phases Inspected	Yes		No	
	No.	Per Cent	No.	Per Cent
Have provisions been made to regulate parking of automobiles in the vicinity of the school?	19	48	21	53
Have arrangements been made to designate streets near the school as "School Crossings" during the peak of school traffic?	15	38	25	63
Are parking accommodations provided for bicycles?	16	40	24	60
Does the school maintain a school patrol system?	5	13	35	88
Does the school maintain a safety council?	3	8	37	93
Does the school sponsor a safety court?	1	3	39	98

FIRE PROTECTIVE MEASURES

Table VII reveals that in 98 per cent of the schools the doors open outward in all cases. In one school doors that open inward were found directly inside entrance doors. In 70 per cent of the schools, exits are provided with panic bolt appliances. In many of the buildings the en-

TABLE VII

SAFETY CONDITIONS PERTAINING TO EXITS AND FIRE ESCAPES

Conditions	Yes		No	
	No.	Per Cent	No.	Per Cent
Do all doors open outward?	39	98	1	3
Are all the entrance doors provided with panic bolt appliances?	28	70	12	30
Are all fire exits kept unlocked while school is in session?	40	100	0	0
Does the engineer or janitor examine the fire escapes and doors at least once a week and make a written report of such examination on the first of every month to the principal or superintendent in charge of the school?	0	0	40	100
* Are all exit doors to fire escapes provided with panic proof bolts?	27	79	7	21
† Are two exits remote from each other provided from every floor, including the basement?	33	87	5	13
‡ Can the screening on basement windows be easily unfastened from the inside?	19	51	18	49

* Six of the forty schools have no fire escapes.
† Two of the forty schools have only one floor.
‡ Three of the forty schools have no basements.

trance doors are the only ones equipped with panic bolts. In all cases the school officials report that exit doors are kept unlocked at all times when school is in session.

No written reports are made of the condition of the fire escapes and exit doors by the engineers or janitors to the principals or superintendents. Exit doors to fire escapes are equipped with panic bolts in 79 per cent of the 34 school buildings that have fire escapes. In 21 per cent of the cases these precautions are not taken. In 15 per cent of the 40 schools they do not have fire escapes.

In 51 per cent of the buildings the basement windows can be used as exits in case of fire. In 49 per cent of the schools the screening on basement windows is fastened in such a way that it cannot be readily opened or removed. In 28 per cent of the cases it is reported that they do not conduct fire drills. Of those remaining, 7 per cent conduct fire drills bi-monthly; 83 per cent monthly; 7 per cent conduct them three times each year; and 3 per cent twice each year.

In two schools there are cases of permanently disabled children in attendance. In both cases provisions have been made to assist the children from the building in case of fire. In all schools where fire drills are conducted, provisions have been made for teachers to see that all children are out of the building when fire drills are held. A few of the custodians check the basement and toilets when fire drills are held.

Table VIII shows the results of the inspection pertaining to fire alarms, fire drills, and reports in the 40 schools. Eighty per cent of the school buildings are equipped with fire alarms. Sixty-three per cent of the 32 schools have fire alarms of a distinctive note that can be readily distinguished from other bells. Thirty-eight per cent use the

TABLE VIII

Conditions Pertaining to Fire Alarms, Fire Drills, and Reports

Questions	Yes		No	
	No.	Per Cent	No.	Per Cent
Do all schools have fire alarms?	32	80	8	20
Is the fire alarm of a distinctive note in order that it may be readily distinguished from other school bells?	20	63	12	38
Can the alarm be heard distinctly in all parts of the building?	32	100	0	0
Are signal or alarm stations located at several points in the building, at least one on every floor?	9	28	23	72
Does the school administrator make a written report the first of each month to the fire marshal showing all such examinations made and conditions of fire apparatus, exits, doors, alarms and fire escapes?	3	8	37	93

same bells that are used to signal the beginning and ending of class periods.

The school administrators in 8 per cent of the schools make a written report at the beginning of each month to the city fire marshal showing conditions of fire apparatus, exits, doors, and fire escapes. Eighty-five per cent of the schools are equipped with fire escapes. Fifteen per cent of the school buildings do not have fire escapes. Table IX shows that 60 per cent of the school buildings seem to be sufficiently equipped with fire extinguishers. In 40 per cent of the cases it is obvious there is an insufficient number of fire extinguishers throughout the buildings. The water supply is adequate and conveniently located in 45 per cent of the cases. The nozzles and hose are free from obstruction in all cases.

TABLE IX
RESULTS OF THE INSPECTION OF FIRE PROTECTIVE EQUIPMENT

Equipment Inspected	Yes		No	
	No.	Per Cent	No.	Per Cent
Is the building sufficiently equipped with extinguishers?	24	60	16	40
Is the date of recharge recorded on an attached tag, within the current year?	29	88	4	12
Are nozzles and hose free from obstructions?	33	100	0	0
Is the water supply adequate and conveniently located for use in fighting fire?	18	45	22	55

Table X shows the results of the inspection for orderliness and practices pertaining to fire protection. In 43 per cent of the school buildings oily rags, floor mops, and waste are kept in metal containers. Fifty-eight per cent of the buildings are not equipped with metal containers. In one school rubbish is allowed to accumulate in corners and under stairs. The waste paper is collected and disposed of daily in all the schools. In 85 per cent of the schools that use coal the ashes are kept in metal containers. Fifteen per cent use gas or oil for fuel.

TABLE X
RESULTS OF THE INSPECTION FOR ORDERLINESS IN PRACTICES PERTAINING TO FIRE PROTECTION

Practices	Yes		No	
	No.	Per Cent	No.	Per Cent
Are oily rags, floor mops, and waste kept in metal containers?	17	43	23	58
Is rubbish allowed to accumulate in corners and under stairs?	1	3	39	98
Is waste paper collected and disposed of daily?	40	100	0	0
Are ashes put in metal, covered cans or removed at once?	34	100	0	0

Table XI shows results of the safety inspection regarding certain phases of building construction. Seventy per cent of the buildings have tar and gravel roofing; 15 per cent have slate roofing; 5 per cent have wood shingle roofing; 5 per cent have rubberoid; one school has tile roofing; and one building has three-ply felt asphalt roofing.

TABLE XI

Safety in Certain Phases of Building Construction

Phases	Yes		No	
	No.	Per Cent	No.	Per Cent
Do boiler rooms have noncombustible or fire-resistive walls and floors and self-closing doors?	23	58	17	43
Are the corridors at least eight feet in width where doors swing into them and not less than six feet otherwise?	39	98	1	3
Is the heating plant in a separate unit?	5	13	35	88
Is the auditorium on the first floor?	29	73	11	28
Is the gymnasium on the first floor?	39	98	1	3

In 58 per cent of the school buildings there are boiler rooms with non-combustible walls and floors and in each case there are self-closing doors. In 13 per cent of the cases the heating plants are maintained in separate buildings.

SAFETY CONDITIONS IN SPECIAL ROOMS

Table XII shows the results of the inspection of school shops. Eighty-three per cent of the schools maintain school shops. Of this number 48 per cent have more than one exit. Sixty-one per cent are provided with metal containers for the disposal of waste material. Ninety-four per cent of the school shops appeared neat and orderly. In 7 per cent of the cases cans of gasoline were left carelessly about the room. In 52 per cent of the shops wood shavings are put in wooden boxes or swept into the corners to be removed by the custodians at the end of the day. In one shop a suction system of metal tubing had been installed by students to dispose of shavings.

Fifty-five per cent of the shops are provided with fire extinguishers in readily accessible places. Fire blankets to be used in case of ignited clothing are not provided in any of the school shops. Forty-one per cent of the shops that have power tools are well equipped with guards for the machinery. In 59 per cent of the cases adequate safety guards are not provided on power saws, planers, and other tools. A central switch control is readily accessible in 70 per cent of the 33 shops. First-aid materials are available in 48 per cent of the shops.

TABLE XII

SAFETY CONDITIONS IN SCHOOL SHOPS*

Phases Inspected	Yes No.	Yes Per Cent	No No.	No Per Cent
Do shops have more than one exit?	16	48	17	52
Is a metal container provided for the disposal of oily rags?	20	61	13	39
Are oily rags, bottles or cans of gasoline or other inflammable substances left carelessly about?	2	7	31	93
Is a metal container provided for shavings in the shop?	15	45	18	55
Is the shop provided with fire extinguishers in accessible places?	18	55	15	45
Is a fire blanket immediately obtainable in case of ignited clothing?	0	0	33	100
† Are safety guards provided for power machines in the shop?	13	41	19	59
Are first-aid materials available in the shop?	16	48	17	52
Is a master switch controlling electrical devices easily accessible?	23	70	10	30
Are safety lanes painted around power tools?	2	7	31	93

* Seven, or 18 per cent, of the 40 schools have no shop.
† One school shop has no power tools.

Table XIII shows the results of the inspection regarding the safety conditions of the home economics rooms in the 34 schools maintaining them. In 53 per cent of the home economic rooms there is more than one exit. Gas is used in 76 per cent of the schools. Metal piping is used in all cases. Electricity or kerosene is used for fuel in 20 per cent of the cases. Fire extinguishers are readily accessible in 59 per cent of the home economics rooms. Nine per cent provide fire blankets for use in case of ignited clothing. First-aid material is provided in 41 per cent of the home economics departments.

TABLE XIII

SAFETY CONDITIONS OF HOME ECONOMICS ROOMS *

Phases Inspected	Yes No.	Yes Per Cent	No No.	No Per Cent
Do the home economics rooms have more than one exit?	18	53	16	47
† Is metal piping used for the connection of gas appliances?	26	100	0	0
Are fire extinguishers provided in accessible places?	20	59	14	41
Is a fire blanket provided for use in case of ignited clothing?	3	9	31	91
Are first-aid supplies readily available?	14	41	20	59

* Six, or 15 per cent, of the 40 schools do not have home economics.
† In eight, or 20 per cent, of the home economics rooms, fuel other than gas is used.

Table XIV shows the results of the inspection of safety conditions in the science laboratories. In 48 per cent of the cases there is more than one exit. Fire extinguishers are provided in accessible places in 58 per cent of the laboratories. Fire blankets for use in case of ignited clothing are not provided in any of the laboratories. First-aid materials are readily available in 23 per cent of the cases. Chemical containers are clearly labelled in 100 per cent of the science laboratories.

TABLE XIV

SAFETY CONDITIONS OF SCIENCE LABORATORIES

Phases Inspected	Yes		No	
	No.	Per Cent	No.	Per Cent
Do the science laboratories have more than one exit?	19	48	21	53
Are fire extinguishers provided in accessible places?	23	58	17	43
Is a fire blanket provided in case of ignited clothing?	0	0	40	100
Are first-aid supplies available?	9	23	31	78
Are the chemical containers clearly labelled?	40	100	0	0
* Whenever rubber tubing is used for the connection of gas appliances, are the shut-off valves located at the pipe to which the rubber tube is connected?	26	100	0	0

* Fourteen, or 38 per cent, of the schools do not use gas.

SUMMARY AND CONCLUSIONS

A survey was made of the safety conditions of buildings and grounds of 40 representative high schools in the middle west. Personal visitations were made to each school. A check list was used to assure uniformity in the inspections.

The following conclusions are drawn from the results of the inspection of the 40 schools:

1. In many schools the play areas present a hazard to students because of the irregularity and type of surface and the proximity of buildings and other immovable objects.

2. In a large majority of the schools, play areas are not enclosed by fences.

3. School officials are uncertain about the frequency of the safety inspection of athletic equipment in a majority of the schools.

4. Posts and walls present a hazard near gymnasium playing areas in many schools. In a large number of cases the posts and walls are not padded.

5. Adequate first-aid materials are provided in readily accessible places in a majority of the schools.

6. Highly polished floors are a hazard in 15 per cent of the schools.

7. In a large majority of the cases the glass in entrance doors is not shatter-proof. However, 98 per cent are double- or triple-strength glass.

8. A majority of the schools have not made provisions for the parking of automobiles. Thirty-eight per cent have designated "school crossings" during peak hours of school traffic.

9. Forty per cent of the schools have made arrangements for the parking of bicycles.

10. In 98 per cent of the schools all doors open outward.

11. Sixty-three per cent have fire alarm systems of a distinctive note; 38 per cent use the same system used for signalling the beginning and ending of class periods.

12. School shops, home economics rooms, and science laboratories are reasonably well equipped for safety. Many cases were found, however, where safety precautions should be taken.

An Abstract of an Analysis and Evaluation of Physical Education Activities in the Lafayette, Indiana, Public (Grade) Schools

By Clarence E. Kelly

Assistant Principal and Director of Physical Education
Ford School, Lafayette, Indiana

PROBLEM INVESTIGATED

THE purpose of this thesis was to make a survey of the nine public grade schools of Lafayette, Indiana, for the purpose of evaluating the physical education program and the general health, recreation, and safety provisions of the schools. The specific aim was to disclose significant weaknesses that are subject to improvement, rather than to present merely a critical rating of the schools.

SOURCE OF DATA

1. The study was limited to the physical education activities carried on during the 1939–40 school year.

2. The LaPorte score card was used in a survey of information on the different activities, secured by means of personal interviews.

3. A questionnaire designed to sample opinion concerning the relative value of different activities and certain administrative procedures in the physical education program was distributed and summarized.

METHODS OF COLLECTING DATA

The procedures used in the collection of data involved five techniques:

1. The collection of the program plans from each of the supervisors.

2. The LaPorte score card was used in the scoring of each school by the supervisor, the principal, and the investigator.

3. The collection of opinions on relative values of different activities and on certain administrative problems was obtained through the use of questionnaires sent to all grade teachers.

4. A comparison was made of score card findings with published opinions of experts.

5. An evaluation was made of activities and program in terms of information gathered in numbers 1, 2, 3, and 4 above.

FINDINGS

1. Using *The Physical Education Curriculum* by William R. La-Porte, as the authority, the program in grades 1 to 4 scored 86.33 points out of a possible 150. The average per cent of the possible score was 58.

2. Using the above authority, grades 5 and 6 scored 90.33 points out of 150. The average per cent of the possible score was 60.

3. Using the above authority, grades 7 and 8 scored 99.67 points out of a possible 300. The average per cent of the possible score was 33.

4. Those items associated with medical examinations and health services rated highest.

5. Those items associated with organization and administration seem to be fairly well taken care of.

6. The program of activities is rather limited in grades 5, 6, 7, and 8.

7. The administration of interscholastic athletics is partially handled by volunteer coaches, who are not teachers.

8. There are no intramural nor coeducational activities.

9. Supplies and equipment are partially furnished by the School Board, but are not always adequate. Each school gives carnivals, plays, musicals, etc., to make up for the deficiency in supplies and equipment.

10. Outdoor areas are few and for the most part very inadequate.

11. Indoor areas are very limited. Only three of the nine schools have gymnasiums.

12. There are no swimming facilities in the school system.

13. Nothing is done in corrective work.

14. Boys and girls take physical education together and no gym shoes or suits are required in any grade. The majority of teachers are of the opinion that this is as it should be in their system.

15. The majority of teachers thought 20 minutes per day was sufficient time for physical education classes.

16. Most teachers favored a field day once each four years.

17. Most teachers want some kind of playground equipment in spite of the ruling against it.

18. Athletic sports were rated lower in value than rhythmics, calisthenics, motor-movements (walking, running, skipping, etc.), and self-testing activities.

19. Using Neilson and Van Hagen as the authorities, the program for grades 1 to 4 meets the requirements, but is below the standard for grades 5, 6, 7, and 8.

20. Using the Indiana State Course of Study as the authority, the program for grades 1 to 4 meets the minimum requirements, but falls below the standard for grades 5, 6, 7, and 8.

A Consideration of Qualities Used by Administrators in Judging Effective Teachers of Physical Education in Minnesota

By Elizabeth Graybeal

Duluth State Teachers College
Duluth, Minnesota

In an attempt to give more and better guidance to students preparing to teach physical education and to improve instruction in this field, the writer sent a list of 23 items to 225 superintendents and principals in the larger cities and towns of Minnesota asking them to check the qualities submitted according to whether they considered them of great importance, of considerable importance, of slight importance, or of no importance in judging effective teachers of physical education. The administrators were also asked to add other qualities which they considered of great importance. Two hundred four responses were received, a report of which is presented here.

The accompanying table gives the list of items submitted and shows how they were checked in the four categories. The items are rearranged so that those considered to be of great importance are in rank order. The ranks of qualities judged by administrators to be of considerable importance are indicated in their respective columns by the small numbers in parentheses following the frequency numbers.

Understanding of physical abilities and limitations of pupils is considered by superintendents and principals to be the most important asset in a teacher of physical education as indicated by a frequency of 183. Integrity and sincerity was checked by 180 as being of great importance. Moral influence over pupils and willingness to cooperate with superiors and associates come next, each with frequencies of 172. Physical health and vigor ranks fifth, knowledge and understanding of nature of pupils, sixth, and initiative, self-reliance, and independence is seventh. Adequate professional training; efficiency in handling disciplinary problems; unselfishness, fairness to associates; potential teaching ability; inspirational power; and skill in many motor activities were rated by more than half of the administrators as being of great importance in effective teachers of physical education.

In column two may be seen qualities checked by superintendents and principals as being of considerable importance in judging effective teachers of physical education. A comparison of the first and second

columns shows that items appearing at the bottom of one are at the top of two in order of frequency. Care of routine matters, records and reports, is at the top of this list, having been checked by 148 administrators. High grade of scholarship and interest in community affairs

QUALITIES CHECKED BY SUPERINTENDENTS AND PRINCIPALS ACCORDING TO THEIR IMPORTANCE IN JUDGING EFFECTIVE TEACHERS OF PHYSICAL EDUCATION

		Of Great Importance	Considerable Importance	Of Slight Importance	Of No Importance
1	Understanding of physical abilities and limitations of pupils	183	21 (22.5)		
2	Integrity and sincerity	180	24 (22.5)		
3.5	Moral influence over pupils	172	30 (21)	2 (15.5)	
3.5	Willingness to cooperate with superiors and associates	172	31 (20)		
5	Physical health and vigor	166	36 (19)		
6	Knowledge and understanding of nature of pupils	154	48 (18)	1 (17.5)	
7	Initiative, self-reliance, independence	146	51 (17)		
8	Adequate professional training	131	69 (16)	1 (17.5)	1
9	Efficiency in handling disciplinary problems	127	72 (15)	3 (13.5)	
10	Unselfishness, fairness to associates	121	79 (14)	3 (13.5)	
11	Potential teaching efficiency	112	87 (11.5)	2 (15.5)	
12	Inspirational power	111	89 (10)	4 (11.5)	
13	Skill in many motor activities	110	86 (13)	8 (9)	
14	Social culture	99	101 (9)	4 (11.5)	
15	Personal appearance	83	110 (8)	10 (7)	
16	Continued professional growth	80	118 (7)	5 (10)	
17	Administrative ability	65	126 (5)	13 (5.5)	
18	Popularity—ability to be a good mixer	60	125 (6)	13 (5.5)	2
19	Care of routine matters—records, reports	44	148 (1)	9 (8)	1
20	An enriched background of academic knowledge	39	134 (4)	28 (4)	
21	Interest in community affairs	32	140 (3)	32 (3)	
22	Ability to advertise the institution	19	87 (11.5)	85 (1)	15
23	High grade of scholarship	18	142 (2)	38 (2)	1

are next with frequencies of 142 and 140. Following appear: an enriched background of academic training, administrative ability, popularity and the ability to be a good mixer, continued professional growth, personal appearance, and social culture.

Qualities checked by superintendents and principals as being of

slight importance in judging effective teachers of physical education may be noted in column three. Ability to advertise the institution ranks first in this category. High grade of scholarship comes next after a large gap, indicating that most administrators, as shown in column two, consider this item of considerable importance. Interest in community affairs and an enriched background of academic training appear to be thought of as having slight importance in judging teachers in this field, as indicated by frequencies of 38 and 28.

Qualities considered to be of no importance in teachers were negligible and might with one exception be due to errors in checking; therefore no special discussion of them seems necessary. One exception would seem to be of interest since 15 administrators consider that the ability to advertise the institution is of no importance in teachers of physical education.

It will be recalled that the administrators were asked to add other qualities not included in the list submitted. Twenty-six of them apparently gave much thought to the matter and added many interesting items. Unfortunately the number who mentioned any single item is so small that no generalizations can be made. Several of the items might well be included in other or more extensive studies of this nature and are mentioned here for what they may be worth.

Six administrators added an understanding and love of children and a wholesome pupil-teacher relationship as being of prime importance in effective teachers of physical education. Four think a knowledge of personal health, and ability and desire to teach it so that the children gain a real appreciation of health are necessary qualities. Six superintendents are apparently not satisfied with curriculums in physical education in their school and express a desire for better developmental programs, better programs for the handicapped, more ability in curriculum construction, the planning of units and the daily lesson.

Ingenuity, resourcefulness, and constructive leadership; enthusiasm, love of physical education, and ability to sell program are each mentioned by two administrators; knowledge of mental hygiene; ability to function as guide; cheerfulness and even temper; common sense and good judgment are each mentioned by two. One educator adds the remark that because physical education teachers are so close to the pupil they should be given an important place in the guidance setup. Other items that would seem to be worthy of consideration by teacher-training departments are: ability to place more emphasis on the social development of the child, knowledge of state regulations, and a thorough acquaintance with various types of physical equipment, manufacturers, dealers, costs.

Although no request was made for a list of undesirable qualities in teachers of physical education, several administrators evidently felt so strongly with respect to some such qualities that they included a

number of them. Three superintendents added as undesirable: too much stress on athletics, too little emphasis on health education; too little emphasis on general physical efficiency; too much stress on recreational activities; lack of ability to provide an interesting program in "the average gymnasium where there is lack of equipment." It was twice remarked that physical education teachers, more than other teachers, lack social qualities.

CONCLUSIONS

This study seems definitely to indicate that school administrators consider it of prime importance that their teachers of physical education should have: (1) understanding of the physical abilities and limitations of pupils; (2) personal integrity and sincerity; (3) moral influence over pupils; (4) willingness to cooperate with superiors and associates; (5) personal health and vigor; (6) knowledge and understanding of the nature of pupils; and (7) initiative, self-reliance, and independence. They desire certain other qualities which, while not of the greatest importance, are of considerable importance and are desirable in their teachers of physical education. Qualities at the top of this list include: (1) the ability to care for routine matters, keep records, make reports; (2) a high grade of scholarship; (3) interest in community affairs; (4) an enriched background of academic training; (5) administrative ability. The quality ranking highest as being of slight importance is the ability to advertise the institution. Indeed, 15 administrators consider that this ability is unnecessary in their teachers of physical education. A high grade of scholarship, interest in community affairs, and an enriched background of academic training are thought to be of slight importance by a surprisingly large number (38, 32, and 28).

USES OF THE DATA

While these data are not entirely conclusive, they might well be used to advantage as a check on curriculum and course content. They should aid in guiding the prospective teacher to realize and appreciate certain definite responsibilities of teachers of physical education. Furthermore, they give food for thought to teachers and leaders in the field relative to educating administrators to expect the same high qualities of scholarship and enriched background of academic training that is expected of teachers in general.

Possible Neuromuscular Mechanism as Limiting Factor for Rate of Leg Movement in Sprinting

By Arthur Slater-Hammel

WITH the factors of nutritional status, athletic condition, calibre of coaching, experience, etc., relatively equal, it is generally assumed that differences in sprinting performance are due to individual differences in neuromuscular responses. In a group of well-trained performers, an individual emerges victor because he possesses certain favorable neuromuscular or physiological characteristics. Precisely what some of these characteristics are has been the concern of several investigations in physical education.

Westerlund and Tuttle, 1931,[45]* made a study of the reaction time of dash men, middle distance runners, and distance runners. They found the mean reaction time for each group was:

Dash men	.131 sec.
Middle distance runners	.149 sec.
Distance runners	.169 sec.

The correlation between reaction time and speed in running the 75-yard dash for these three groups was also investigated and found to be .863.

Lautenbach and Tuttle, 1932,[21] found there was a direct relationship between reflex time of track men and the distance for which they were specially trained. The sprinters had the shortest reflex time and the distance runners the longest; the middle distance men fell between these two groups. The correlation between reflex time and speed in sprinting was .815.

Browne, 1935,[4] made a study of the reflex time of 82 whites and 81 negroes and found the mean of the former to be $.0861 \pm .0013$, the latter $.0774 \pm .0009$.

The interpretation of these apparent neuromuscular characteristics offers several possibilities. One is that it may be indicative of a neuromuscular mechanism which determines the speed at which muscles contract. That one individual is able to respond quicker than others to a reaction or reflex time situation may conceivably be due to the fact that there is a neuromuscular factor in operation which permits his muscles to contract in a shorter period of time. Such a factor would

This paper is from the Psychological Laboratory, Oberlin College, Oberlin, Ohio.
* Superior figures refer to numbered Bibliography at end of article.

naturally enable the individual to reach a higher leg rate in running and result in his having a shorter time in the sprint.

The major objection to the above suggestion, which essentially is that reflex and reaction time give a measure of muscular contraction, lies in the assumption that muscular contractions and movement are always coincidental. With this condition, reflex and reaction time represent the duration of a chain of events which in its simplest sequence includes stimulation time of receptor, conduction time of neural impulse along afferent neuron-nerve center-efferent neuron-synaptic junction, and latent period of muscle. This interpretation accounts for activities *up to the time of muscular contraction,* and under these conditions it would be impossible to consider any measure of reflex or reaction time as indicative of speed of muscular contraction. There is, however, a considerable and growing body of evidence which shows that all contractions are not continuous with the resulting movements. In contrast to the former belief, which makes all movement a matter of the member being dragged over its path by the contracting muscle and considers all muscular contractions isotonic in nature, the experimental evidence clearly shows that in many movements ("ballistic") the member is literally thrown and the driving muscular contractions may come in only during the isometric state or during the isometric state and the early portion of the movement. In some reciprocal movements the muscular contraction may be confined solely to the anametric state. (Hubbard and Stetson, 1938 [15]). Other than to state that the experimental evidence shows there are movements in which the driving contractions have been completed, or nearly so, before the movement gets under way and that the muscular contractions of the usual reflex and reaction time situation are of such a nature, in which case the reflex and reaction time would include a measure of muscular contraction, the writer does not feel it within the scope of this paper to enter a discussion of the relationship between muscular contraction and movement. For those readers who may welcome a discussion of the view that all muscular contractions are alike and the experimental evidence which differentiates movements into types, a recent paper by Hartson, 1939,[12] is suggested. For those wishing further information on the classification of movements into types and its application to movement problems the following studies are offered: Beaunis, 1885; [2] Richers, 1895; [25] Athanasiu, 1902; [1] Stetson, 1905, 1920, 1928, 1931, 1933, 1936, 1937; [28,29,30,31,32,33,34] Isserlin, 1914; [20] Freeman, 1914; [9] Stetson and McDill, 1923; [39] Stetson and Tuthill, 1923; [41] Wachholder, 1928; [42] Cole, 1929, 1939; [5,6] Stetson and Fuller, 1930; [37] Stetson and Hudgins, 1930; [38] Hartson, 1932; [11] Stetson and Bouman, 1933, 1935; [35,36] Hudgins and Stetson, 1935, 1937; [18,19] Miller and Cole, 1936; [24] Stetson and Throner, 1936; [40] Weaver, 1937, 1939; [43,44] Hubbard and Stetson, 1938; [15] Beck, 1939; [3] Hubbard, 1939; [14] Hudgins, 1939,[16] Miller, 1939.[23]

This paper is an investigation into the neuromuscular mechanism as the possible limiting factor for the rate of leg movement in sprinting. A definite knowledge of such a mechanism would be of great importance to the physical educator. It would, for example, enable a track coach to determine quickly which members of his squad have possibilities as sprinters. In general, it would enable the physical educator to suggest the activities for which the student is best suited.

EXPERIMENTAL METHOD

The study involved securing and comparing the leg rates of a group of subjects in running a 100-yard dash and in pumping a stationary bicycle. The dash was conducted on a 100-yard straight-away cinder track. Since several investigations [7,8,10,26] have shown rather large possible errors in stop-watch timing of races, the dash in this experiment was mechanically timed. Immediately after each trial, the number of strides was counted, and the data used were calculated in the following manner:

$$\text{Rate of stride} = \frac{\text{Number of strides}}{\text{100-yard dash time}}.$$

The readings of the leg rate while pumping were secured in the laboratory on a stationary bicycle. An electrical counter was used to count the number of cycle revolutions. Each subject pumped for a period of ten seconds. The leg rate per second was found by:

$$\frac{\text{Revolutions per trial}}{\text{Time per trial}}$$

Ten readings of the leg rate were secured from each subject. The differences between the ten readings secured was found to range from .3 to .9. To get a clearer picture of the maximum rate for each subject, it was decided that all series which had a range greater than .6 be reduced to this range. This was done by discarding the lower rates in the series. (For example, the leg rates for subject 10 were: 6.5, 6.8, 7, 7, 7.1, 7.1, 7.1, 7.2, 7.3, 7.3 per second. The range for this series is .8. By discarding the lowest rate, the range is reduced to .5.) In no instance was it necessary to discard more than two of the lower rates in any series. The average for each series was then found. This is called the maximum leg rate for cycling.

To make certain that each revolution of a leg while pumping was the result of definite muscular contractions and not of momentum or of any other factor, pneumatic recordings of foot pressure and muscle deformation were taken from one-half the subjects while pumping the bicycle.

Twenty-nine Oberlin College students were used as subjects in this experiment. Seven were trained runners, having both high school and

college training and running experience. Eight had some high school training and running experience. Fourteen had no training whatsoever in running.

APPARATUS AND PROCEDURE

1. 100-Yard Dash

Figure I gives a diagram of the electrical circuit used in the timer. At the start of the dash, the subject ran through a wire stretched across the running lane and pulled a hard-rubber plug out of a special plug telephone jack. This closed the electrical circuit and resulted in the armature's being drawn to the magnet of an electro-magnet. A screw on the

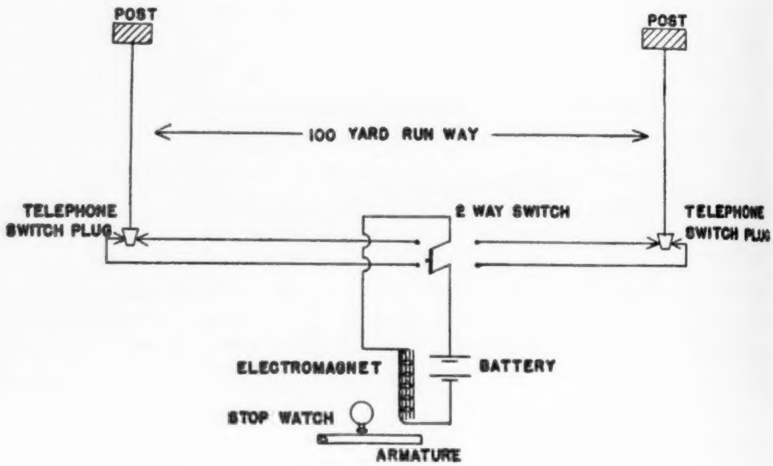


FIGURE I

armature pushed in the stem of the stop watch, starting the watch. After the watch had been thus started, a two-way switch was raised and thrown to the other side. The circuit was again opened, and the spring in the stem of the watch forced the armature back from the magnet. The same sequence of events followed at the finish of the dash: The subject ran into a wire stretched across the finish line, the circuit was closed, the armature was drawn to the magnet, and the watch-stem was again pushed in, this time stopping the watch. Figure II is a photograph of the timing unit and shows arrangement of electromagnet, armature, and stop watch.

A flexible, covered wire was stretched across the start and finish of the 100-yard running lane. One end of the wire was fastened to a post on the outside of the running lane at about hip height. The hard-rubber plug was attached to the other end. The telephone jack was screwed to a post on the inside of the lane. The plug and jack contact was so

sensitive that it could easily be broken by a blow from the finger. No subject complained of being hurt or stung by the wire used.

Laboratory tests showed the mechanical timer to be accurate to .05 sec. This is well within the limits of accuracy for reading the stop watch, which can be read accurately only to the nearest .1 sec.

Each subject wore a regulation track suit and light-weight tennis shoes. Before the dash the subject was instructed to warm-up. This

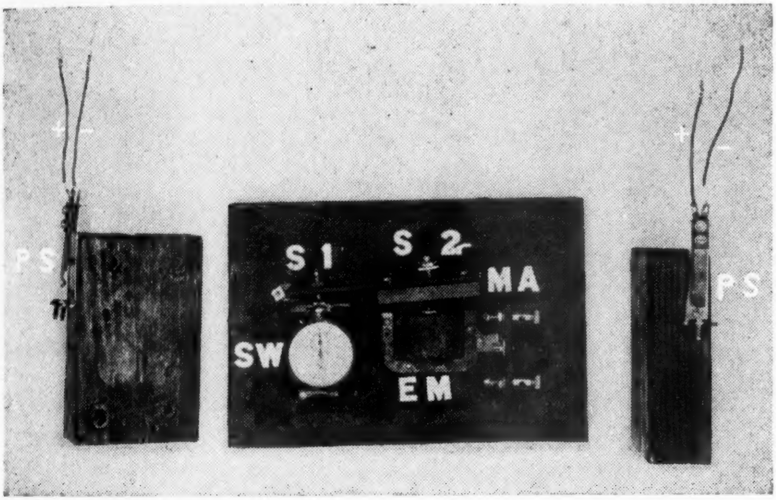


FIGURE II. Mechanical timing unit. PS, plug telephone jack; SW, stop watch; MA, magnetic armature; EM, electro-magnet; S1, S2, adjustment screws.

generally consisted of a few limbering exercises and a slow jog around the quarter mile track. In the dash the subject was permitted to get as far behind the hundred yard starting wire as he felt necessary to attain top speed by the time he reached the wire. Most subjects selected a distance of about twenty yards behind the starting wire. All subjects used an upright start, as getting away fast was no factor in the trial.

2. Bicycle Pumping

An ordinary man's bicycle was used. The rear wheel and chain were removed, and the back of the bicycle frame was clamped to a block of wood 32 x 15 x 15 cm. The bicycle was secured by leading guide wires from either side of the frame just below the handle bars to the floor and from just below the seat to the floor. A guide wire was also led from the frame near the sprocket to the floor to eliminate sway in that region. The connections of all guide wires were soldered to prevent slipping. The guide wires were tightened by means of turn buckles (Figure III).

A counter registered every time an electrical contact was made. One contact was made with a thin U-shaped piece of phosphor-bronze which was attached to one of the pedals. The other contact was made with an 8 x 8 cm. of copper plate which was attached to a small block

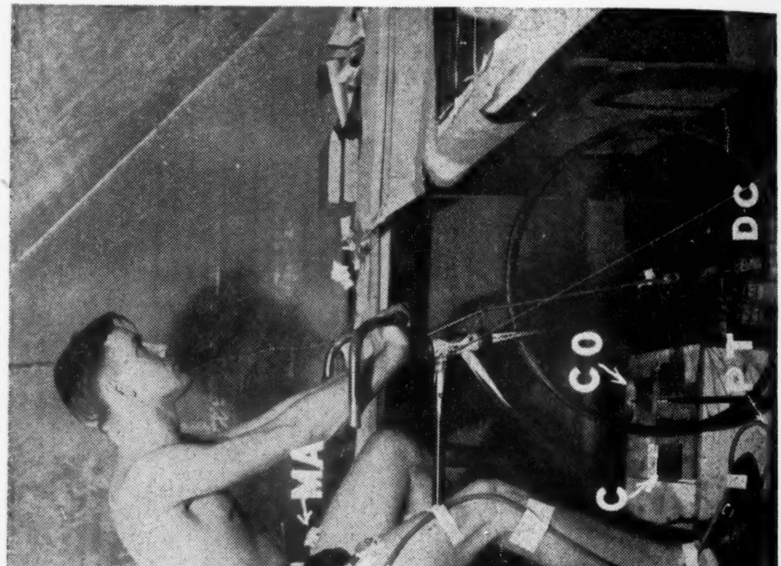


FIGURE III. Disposition of subject and arrangement of apparatus for obtaining cycling rates and muscle deformation recordings. K, kymograph; P, pneumodeik; MA, muscle applicator; C, contact plate; CO, electrical counter; PT, foot pressure tubing; DC, dry cells.

of wood. The block with the copper plate was hinged to a low platform alongside the bicycle pedal. Figure IV gives a diagram of the electrical circuit.

The subject removed all clothing but trunks, socks, and shoes. The feet were strapped to the pedals to prevent slipping off. Each subject was allowed about ten minutes to get accustomed to pumping with no load on the bicycle. During this time the seat and handle bars were raised and lowered until the height the subject felt most satisfactory for

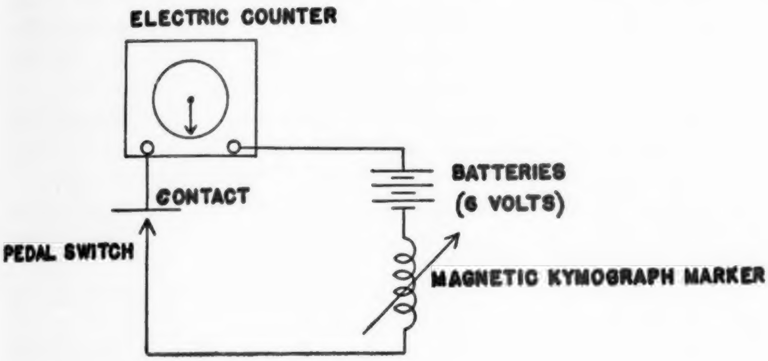


FIGURE IV

pumping was found.* After all adjustments had been made and the subject felt ready for the job of pumping, he was instructed to pump as fast as he could for ten periods of ten seconds each. He was further instructed to rest as long as he felt necessary between trials, and if he felt too tired before completing all trials he was to stop and complete them at another time. Ten subjects completed the trials at one setting, the rest (nineteen) completed five trials at one setting, and five at a later period.

3. Muscle Deformation and Foot Pressure Recording

The method involved the recording of the condensation and rarification of an enclosed air column. The muscle deformation and foot pressure caused an air pulse which was recorded by a pneumodeik. This technique has been used for several studies in the Oberlin Psychological Laboratory.[13, 22, 46]

The applicator for recording muscle deformation consisted of a 4 cm. aluminum cup, into the side of which a small rubber tubing was inserted. The top of the cup was covered with a sensitive diaphragm. A small conical cork boss was fastened to the diaphragm. The cup was rendered air-tight by coating the ends of the diaphragm and the point

* A memorandum of the seat height was kept, and it is interesting to note that all subjects finally selected a height in which the leg was almost completely extended when at the bottom half of the pumping cycle.

of entry of the rubber tubing with collodion and then wrapping with adhesive tape. The diaphragm was strong enough to force the cork boss into the muscle without distressing the subject. The applicator was taped over the quadriceps femoris of each leg at the point where the greatest deformation appeared when the subject tensed the muscle. The entire applicator was small enough to eliminate most of the effects of skin stretching.

A 12-cm. piece of heavy pressure tubing was used to record the driving pressure of the foot against the pedals. One end of the tubing was sealed off, and glass tubing was inserted into the other end. The pressure tubing was taped diagonally across the pedal so that the glass tube extended to the outer end of the pedal (Figure IV).

The type of pneumodeik used was developed in the Oberlin Laboratory and has been described by Hudgins and Stetson, 1932.[17]

The kymograph to record the muscle deformation and foot pressure had a horizontal drum which eliminated any possible effects of gravity upon the bamboo stylus. A 15-cm. drum was used to give ample room for recordings.

A magnetic marker, activated by a 50-cycle pulsating current, was used for the time line.

Records were made while the relaxed legs were moved around the cycle by an outside force and while the subject pumped as fast as possible.

RESULTS

The muscle deformation and foot pressure recordings showed, beyond any question, definite contractions of the quadriceps femoris for each cycle of the leg. The movements of cycling in this experiment were caused by driving contractions of the leg muscles, as are the movements of running (Hubbard[13]).

Table I gives the rates for sprinting and cycling. The leg rates in sprinting range from 3.10–4.85 per second, the cycling from 5.6–7.1 per second.

DISCUSSION

Since both the sprinting and cycling movements were the result of driving contractions of the leg muscles, the rates obtained may be considered rates of muscular contraction. The rate of neuromuscular contraction for the leg must therefore be as great, if not greater, than the higher of these two rates. The fact that every subject was able to attain a considerably higher rate when cycling indicates that the rate of neuromuscular alternation is far higher than any possible rate in sprinting. Were this group of rather inferior sprinters able to attain anything like cycling rates in sprinting, they would theoretically be capable of running 100-yards in 6-8 seconds.

There was, of course, no direct evidence that the sprinting rates for this particular group of subjects were maximum rates. They do, however, approach the maximum rates Hubbard[13] found for a group of runners. This investigator found that when the leg rate was pushed beyond 4–5 per second the reciprocal ballistic movements of running broke down into a tense movement or a fixation. Even considering these latter slightly higher rates, it is evident that the limit of leg movement is not a neuromuscular limit.

The question naturally arises as to what factor it is which limits the rate of leg movement in running. The probable answer may be found

TABLE I

NUMBER OF STRIDES AND NUMBER OF CYCLE MOVEMENTS

Record Numbers	Number of Strides per Second	Number of Cycle Movements Per Second	Record Numbers	Number of Strides per Second	Number of Cycle Movements Per Second
1	3.10	5.8 .07	22	4.00	6.4 .14
17	3.40	6.3 .12	12A	4.00	6.5 .24
9	3.54	5.8 .19	12	4.03	6.5 .24
17A	3.55	6.3 .12	29	4.04	6.2 .14
			27	4.05	6.3 .10
5	3.60	6.4 .12	10	4.09	7.1 .10
6	3.71	5.9 .10	4	4.16	6.1 .13
8	3.72	5.9 .13	7A	4.19	6.4 .17
16	3.78	5.8 .13	19	4.23	6.9 .13
23	3.80	6.4 .13	18A	4.24	6.3 .15
11	3.82	6.8 .17	20	4.26	6.2 .18
23A	3.83	6.4 .13	15	4.27	5.9 .14
24	3.83	6.4 .09	28	4.31	6.4 .08
21	3.91	6.3 .05	25	4.36	7.1 .07
14	3.92	6.4 .13	3	4.42	7.1 .10
2	3.95	6.3 .12	13	4.57	6.3 .11
18	3.97	6.3 .15	3A	4.59	7.1 .10
26	3.98	5.6 .21	7	4.85	6.4 .17

in a consideration of what the leg muscles were required to do in each instance. In running the leg muscles had to drive the weight of the whole body forward; in cycling the weight of the body was supported by the seat and the handle bars, and the leg muscles were required to drive only the weight of the legs. And it is apparently the load or weight the muscles must move which determines the rate of movement in running. Sperry, 1939,[27] makes a similar interpretation of his finding that the contraction rate of the large muscles of the shoulder vary under differing conditions of load:

> That the large muscles of the shoulder are quite capable of rapid contraction is further confirmed by the fact that although the maximal rate for reciprocal movements of the whole arm in one subject was about 5.5 per sec., the rate for the same movement with the same muscle, but with the arm flexed at the elbow to reduce the inertia, was about 8.5 per sec. When a 2-kilogram weight was attached to the flexed arm, the rate was slowed down

again to about 5.5 per sec. The comparative slowness of the overt reciprocal movements driven by the large muscle seems to depend upon factors of inertia, as the mass of the load to be moved rather than upon physiological differences.

The conclusion of this study in no wise invalidates the possibility of a neuromuscular mechanism as the ultimate limiting factor for the rate of muscular contraction. Such a possibility has been pointed out by Sperry, 1939 (27, pp. 301–2). He states:

> Sharrington finds that tetanus continues in a muscle preparation 30 sigma after the neural impulses stop. If volleys of impulses are fired into the muscle without allowing about 30 sigma between the separate volleys, there must result an overlapping of the tension in the muscle and blockage of the reciprocal movement. The minimum duration of the action potential itself seems to be at least 35 sigma.

The fact, however, that the reciprocal leg movements of running break down long before they reach the rates achieved in cycling[18] rules out any possibility of action potentials being the limiting factor. The present indications are that the rate of leg movement in running is a relation between muscle and load. This relation is dependent upon the number of muscle fibers available and the coordination of muscle groups. Other factors which will figure both for and against the rate of leg movement are the moment of inertia, the movement of the trunk up and down, and the swinging of the arms.

SUMMARY

1. The experimental findings have shown that the reciprocal leg movements of running were not limited by a neuromuscular mechanism. The leg rates attained in cycling have indicated that the rate of neuromuscular alternation is far higher than any possible rate in sprinting.

2. The present indications are that the rate of leg movement in sprinting is determined by the load, the weight the muscles must move.

BIBLIOGRAPHY

1. Athanasiu, I. "Recherches sur le functionnement des muscles antagonistes dans les mouvements volontaires," *Comptes Rendus de l'Acad. d. Sci.*, 134 (1902) 311–314.
2. Beaunis, H. "Recherches sur la contraction simultanée des muscles antagonistes," *Gaz. med. de Paris*, 56 (1885) 340. Also, *Arch. de physiol. nor. et path., Ser.* 5, 1 (1889) 55–69.
3. Beck, L. H. "Conditioning and the Coordination of Movements," *J. Gen. Psychol.*, 20 (1939) 375–397.
4. Browne, Robert L. "A comparison of the Patellar Tendon Reflex Times of Whites and Negroes," RES. QUART., 6:2 (May 1935) 121–126.
5. Cole, L. E. "The Localization of Tactual Space: A Study of Average and Constant Errors under Different Types of Localization," *Genet. Psychol. Monog.*, 5 (1929) 333–450.
6. ——— "A Comparison of the Factors of Practice and Knowledge of Experimental Procedure in Conditioning the Eyelid Response in Human Subject," *J. Gen. Psychol.*, 20 (1939) 349–373.

7. Cunningham, Glen. "Discrepancy between Stop Watch and Mechanical Timing," *Athletic Jl.*, Oct., 1936.
8. Cureton, Thomas K., and David E. Coe. "An Analysis of Errors in Stop Watch Timing," RES. QUART., 4:2 (May 1933) 94–109.
9. Freeman, F. N. "Analysis of the Writing Movement," *Psychol. Monog.*, 17 (1914) 1–46.
10. Graflund, F. A. "Correlation between Mechanical and Stop Watch Timing," *Athletic Jl.*, Sept., 1936.
11. Hartson, L. D. "Analysis of Skilled Movements," *Person. J.*, 11 (1932) 28–43.
12. ——— "Contrasting Approaches to the Analysis of Skilled Movements," *J. Gen. Psychol.*, 20 (1939) 263–293.
13. Hubbard, A. W. "The Relation between Contractions of Representative Muscles of the Lower Limb and Movements of Locomotion," master's thesis, Oberlin College Library, 1936.
14. ——— "Muscular Force in Reciprocal Movements," *J. Gen. Psychol.*, 20 (1939) 315–325.
15. Hubbard, A. W., and R. H. Stetson. "An Experimental Analysis of Human Locomotion," *Amer. J. Physiol.*, 124 (1938) 300–313.
16. Hudgins, C. V. "The Incidence of Muscular Contraction in Reciprocal Movements under Conditions of Changing Loads," *J. Gen. Psychol.*, 20 (1939) 327–338.
17. Hudgins, C. V., and R. H. Stetson. "A Unit for Kymograph Recording," *Science*, 76 (1932) 59–60.
18. ——— "Voicing of Consonants by Depression of Larynx," *Arch. Néerl. d. Phon. Expér.*, 11 (1935) 1–28.
19. ——— "Relative Speed of Articulatory Movements," *Arch. Néerl. d. Phon. Expér.*, 13 (1937) 85–94.
20. Isserlin, M. "Ueber den Ablauf einfacher willkürlicher Bewegungen," *Psychol. Arbeit.*, 6 (1914) 1–195.
21. Lautenbach, Ruth, and W. W. Tuttle. "The Relationship between Reflex Time and Running Events in Track," RES. QUART., 3 (1932) 138–143.
22. Lumley, A. E. "Breathing Movements in Running," master's thesis, Oberlin College Library, 1931.
23. Miller, J. "The Rate of Conditioning in Human Subjects to Single and Multiple Conditioned Stimuli," *J. Gen. Psychol.*, 20 (1939) 399–408.
24. Miller, J., and L. E. Cole. "The Effect of a 'Voluntary' Reaction upon the Development and Extinction of the Conditioned Eyelid Reaction," *J. Genet. Psychol.*, 48 (1936) 405–440.
25. Richer, M. P. "Note sur la contraction du muscle quadriceps dans l'acte de donner un coup à pied," *Comptes Rendus de la Société de Biologie*, 2 (1895) 204–205.
26. Rumberger, E. K. "The Accuracy of Timing with a Stop Watch," *J. Exper. Psychol.*, 10 (1927) 60–61.
27. Sperry, R. W. "Action Current Study in Movement Coordination," *J. Gen. Psychol.*, 20 (1939) 295–313.
28. Stetson, R. H. "A Motor Theory of Rhythm and Discrete Succession," *Psychol. Rev.*, 12 (1905) 250–350.
29. ——— "Physiological Aspects of Piano-Playing," *Trans. Music. Teach. Nat. Assn.*, 1920, 1–10.
30. ——— "Motor Phonetics," *Arch. Néerl. d. Phon. Expér.*, 3 (1928) 1–216.
31. ——— "The Breathing Movements in Singing," *Arch. Néerl. d. Phon. Expér.*, 6 (1931) 115–164.
32. ——— "Speech Movements in Action," *Trans. Amer. Laryngolog. Assn.*, 55 (1933) 29–41.

33. ——— "The Relation of the Phoneme and the Syllable," *Proc. 2nd Internat. Cong. Phonet. Sci.* (London: Cambridge U. Press, 1936) 245–252.
34. ——— "Esophogeal Speech for Any Laryngectomized Patient," *Arch. Otolaryngol.*, 26 (1937) 132–142.
35. Stetson, R. H., and H. D. Bouman. "The Action Current as Measure of Muscular Contraction," *Science*, 77 (1933) 219–221.
36. ——— "The Coordination of Simple Skilled Movements," *Arch. Néerl. d. Phon. Expér.*, 20 (1935) 177–254.
37. Stetson, R. H., and F. L. Fuller. "Diphthong Formation," *Arch. Néerl. d. Phon. Expér.*, 5 (1930) 31–36.
38. Stetson, R. H., and C. V. Hudgins. "Function of the Breathing Movements in the Mechanism of Speech," *Arch. Néerl. d. Phon. Expér.*, 5 (1930) 1–30.
39. Stetson, R. H., and J. A. McDill. "Mechanism of the Different Types of Movement," *Psychol. Monog.*, 32 (1923) 18–40.
40. Stetson, R. H. and G. C. Throner. "Training for Flexible Posture and Relaxation Movements," RES. QUART., 7:1 (Mar. 1936) 143–150.
41. Stetson, R. H., and T. E. Tuthill. "Measurement of Rhythmic Unit-Groups," *Psychol. Monog.*, 32 (1923) 41–51.
42. Wachholder, K. "Willkürliche Haltung und Bewegung, insbesondere im Lichte elektro-physiologischer Untersuchungen," *Ergebn. d. Physiol.*, 26 (1928) 568–775.
43. Weaver, H. E. "Eye Movements in Memorizing and Recall," *Psychol. Bull.*, 34 (1937) 730–731.
44. ——— "Syncopation: A Study of Musical Rhythm," *J. Gen. Psychol.*, 20 (1939) 409–429.
45. Westerlund, J. H., and W. W. Tuttle. "Relationship between Running Events in Track and Recreation Time," RES. QUART., 2 (1931) 95–100.
46. Wright, W. W. "Determination of Unit of Muscular Contraction," unpublished study filed in the Oberlin Psychological Laboratory, 1936.

A Survey of Devices Used in Measuring Short-Time Intervals

By Aileene Lockhart
Mary Hardin-Baylor College
Belton, Texas

THE measurement of time may be important in physical education activities and investigations. The following is a study of the methods for measuring short-time intervals. A few of these devices have already been employed by physical educators. While many of the others may not have direct practical application from the standpoint of the teacher, these instruments may provide suggestions to research workers for use in the solution of specific problems.

A review of scientific literature reveals that there are various instruments that are used to measure fine intervals of time. These may be grouped into the following general classifications: (1) clocks, watches, and chronometers; (2) pendulums and metronomes; (3) electric current devices; (4) falling objects; (5) photographic and stroboscopic records; (6) tuning forks; and (7) various combinations of the above.

CLOCKS, WATCHES, AND CHRONOMETERS

Very precise *stop watches* which can be read to $\frac{1}{100}$ of a second are on the market. Their operation depends on observers whose recordings are subject to an error which is great in proportion to the time involved, according to Cureton and Coe. [1]* Some of the variables which have been known to cause errors in stop watch timing are: reaction time, the intensity of the stimulus upon which the operator acts, the observer's experience, any pertinent physiological conditions, handling of the watch, resistance of the watch stem to pushing, keenness of the observer's vision, reading the recorded time value, etc.[1, 2]

Stop watches may, however, be operated electrically as well as mechanically. Such watches are started by mechanical interruption at the beginning and end of the event to be timed; *Speakman's automatic race timer* is an example of this kind of watch. Other race timers are started by contact at the firing of the pistol and are stopped by the interruption of a light beam. Some eliminate the light beam; a switch relays the stimuli to an electromagnet which in turn starts a stop watch. True, the errors of lag time and the resistance of the watch stem to pushing are present in such timing devices but since the same circuit

This paper is a portion of a study written at the University of Wisconsin.
*Superior figures refer to Bibliography at end of article.

is actuated at both the start and the finish, compensation is made for any lag time. Examples are Crook's timer and Welser's race timer.[3]

Clocks too may be either spring-wound or driven by electricity. Some electric clocks measure time in very fine intervals and many timing errors can be eliminated by means of them. Electric clocks operate upon the principle of the concurrent movement of a coil and the fluctuations in the alternating current. *Gillet and Johnson's race timer* [5, 6] is an application of synchronous electrical timekeeping. This clock is controlled by the interruption of rays at the start and finish of land and water races. At one time an electrically operated sport timer was made by Lobner, a German manufacturer.

Chronometers are clocks which are especially constructed for measuring time with extreme accuracy. Usually they are constructed so that a graphical record of the time intervals may be secured if this is desired.[4] The clock used by the Gilbreths [7] in their study of micromotion is called the *microchronometer*. The face of this clock is divided into 100 divisions. Since its hands make 20 revolutions per minute, it is possible to read time in units of $1/2000$ of a minute; this is approximately $1/33$ of a second. The clock has three hands, permitting the simultaneous recording of long as well as short-time cycles. At present, still better electric clocks are manufactured which may be read in smaller units.

PENDULUMS AND METRONOMES

Many clocks and chronometers depend upon the swing of a *pendulum*. The pendulum in a simple form may also be used in timing. The occurrence of a given event may be compared with the swing of a pendulum from its support to its center of gravity. [4] The comparison then permits the computation of the actual time interval. *Metronomes* are instruments which are so constructed that it is possible to adjust the tick to a predetermined time interval. Very small unit values may be set on a metronome. However, since this instrument is a spring-wound device, it can be seen that its accuracy becomes less exact as the spring tension lessens.

ELECTRIC CURRENT DEVICES

An interesting instrument is the *Electronic Timer* manufactured by the General Electric Company. Accurate measurements can be made with it to thousandths of a second. It consists of a charged capacitor; the voltage is measured by means of a vacuum tube voltmeter. According to the manufacturers, "from this voltage the time interval is determined from the known relation between the charging current and the capacity.... The action of starting and stopping the charge is controlled by thyraton tubes that are in turn controlled by the relay or device whose time of operation is being measured. These thyratons function as instantaneous 'making and breaking' switches."

Another extremely accurate means of measuring short time intervals is a *"partial deflection"* method by means of which time can be determined to the order of microseconds. Klopsteg discusses this method as follows: "The potential difference of a condenser, after it has been discharged for the interval of time to be measured, is accurately determined by connecting the condenser through a ballistic galvanometer to a known potential difference, which is made nearly the same as that to be measured. A steady current through a known resistance is used as the source of known potential difference.... The method was tested with the aid of a Helmholtz pendulum and it was shown that an interval of 250 microseconds may be measured with such accuracy that the probable error of each observation need not exceed 0.15 per cent."[8] This means of measurement has been used to determine the velocity of high power rifle bullets. It makes possible the determination of the speed of bullets traveling as fast as 900 meters per second between two points twenty centimeters apart: Obviously the partial deflection method demands skill and training of its users.

An interesting example of pure scientific research may be noted here. A clock which may be seen in the Greenwich Royal Observatory[9] is maintained by an electric current controlled by a quartz oscillator. The oscillations have an accuracy of approximately 1 part in 100,-000,000. By means of this device an effort is being made to check the earth's rotation time upon its axis.

The electric eye and photoelectric tubes are used in a *thousandth-of-a-second timer* for racing.[10] Other timers applicable to industrial machinery use electrically driven devices, the electronic portion of which consists of high-vacuum metal tubes.[11]

FALLING OBJECTS

Time can be measured in terms of the distance an object descends simultaneous with the event to be timed. This means of measurement has been suggested for timing intervals whose action is completed in less than .01 minute;[12] the time can be ascertained from the formula for falling bodies. An ingenious machine made by Burpee and Stroll and based on this idea is used to measure the reaction time of athletes. Two unequal weights connected by a light rope pass over a pulley at the top of a 7-foot instrument. The second weight acts as a counterweight, thereby reducing the velocity of the heavier weight and making the instrument more practical. Intervals of time are then measured by the distance the heavier weight descends before it is stopped manually by the individual whose reaction time is being determined.[13] Another similar instrument based on the falling of a weight has been used by physical educators.[14] Since these instruments are operated manually, however, many of the criticisms noted under the mechanical operation of stop watches are applicable here.

PHOTOGRAPHIC AND STROBOSCOPIC RECORDS

One common method of timing is showing the occurrence of the event to be timed by means of photography. *Motion picture cameras* are operated at a known rate of speed. The distance covered by the thing to be timed may be measured on the film; then, knowing the rate of speed of the camera, one can calculate the time consumed by that activity. (Multiply number of pictures by time per picture.) A frame counter and a hand crank control greatly facilitate this analysis. There is, however, a very small error per second due to the opening and closing of the camera shutter in the majority of cameras. Film does not move at the same speed when the shutter is closed as when it is open. The opening is 170 degrees; this leaves the amount closed by the shutter 190 degrees. The shutters on these cameras move by rotating. While the opening is closed by the shutter, the film moves to get ready for the next picture, but at the time that the picture is being taken, the film is still. Since the object to be timed keeps moving, there is a slight error in trying to determine actual speed in terms of distance covered as shown by ordinary motion picture photography. This means of measurement might be used, however, for comparative purposes since this error is a constant one and since it could be computed.

Another factor which must be kept in mind is the slight variation in speed of film-travel due to friction and due to the spring running down; this lessens the spring tension and results in longer exposure time. The better cameras can maintain their speed for 22 feet of film without rewinding. Even when the film is being exposed at exactly a uniform rate, however, there is a difference of speed found in different cameras. For example, two cameras may be in perfect condition but one may make seventeen frames a second while the other makes eighteen. For this reason, if time is to be determined solely by means of the distance an object travels on film, the pictures must all be taken with the same camera and with its spring tension kept up in order that the results may be comparable. One variable, however, which cannot be controlled is unequal film shrinkage or expansion during the process of developing and drying.[15] This error may be as great as two millimeters for 140 centimeters of film distance.

Amateur cameras are not capable of being operated at the fast rates which are possible with very fine cameras. It is advisable to run these better cameras at slow-motion speed (128 frames per sec.) or at a semi-slow-motion rate (64 frames per sec.). This greatly reduces the apparent speed.

It is obvious that more accurate results can be obtained if a camera is driven by an electric motor. The only time measuring device necessary for an accurate analysis of the film is a ruler in cameras in which the velocity is sufficiently high. The length of the cycles can be converted easily from distance into time units.

Cameras which use constantly moving film and substitute mirrors for the regular shutters have been constructed at the Massachusetts Institute of Technology. These are accurate to $\frac{1}{10000}$ of a second! Such cameras are not ordinarily available, but have been used in studies of bullet velocities and in detailed golf studies where the ball is actually seen to flatten out at the moment of the club's impact. A special speed dial can be obtained calibrated for 500, 1000, 2000, 3000, and 4000 frames—compare this with the usual 32 or 64 frames per second used in ordinary work.

Cuykendall [16] has developed an instrument by means of which intervals may be measured from 50– to 600–millionths of a second. It consists of a commercial cathode ray tube and a circuit by means of which the beam can be switched on and off a fluorescent screen. In order to secure the time interval the angle of the electronic beam is measured by tracing the outline with a china marking pencil.

Another instrument which is obviously limited to experimental laboratories is the *stroboscope*. This is a research instrument used in studying high speed objects making it possible to see fast actions by means of intermittent illumination. Light is so controlled that it occurs at given intervals. The eye thus stops the object that is under observation at the same place in each revolution, holding over the successive images by means of persistence of vision. Ultra-speed photography controlled by stroboscopic light makes possible the investigation of such things as the impact and flight of golf and tennis balls. Multiple exposure at rates up to 600 per second have been made in analytical studies of Bobby Jones' golf strokes. In addition, since the frequency of the flashes is known, the speed of a rotating object can be determined easily by the stroboscope, for when the object appears stationary, the frequency of the flashes and the speed of rotation correspond. [17]

TUNING FORKS

In obtaining a record of time in intervals of less than a second, tuning forks are often used. According to Curtis and Duncan, there are three classes of tuning forks: (1) self-driven forks, (2) forks driven by a master fork, and (3) freely vibrating forks.

"A *self-driven fork* is one in which the fork itself operates a device which applies a force to the prongs once during each vibration in such a manner as to maintain its vibrations." The usual device of this kind consists of a combination with an electromagnet. It is important to note that variations have been known to change the period by as much as 5 per cent.

The *master fork,* which is usually a 50– or 100–cycle fork, is driven electrically; this type of fork can successfully drive a 500–cycle fork. The advantage of this type of arrangement is that the time scale can be more minutely divided. But as Curtis and Duncan point out, "the

highest precision (less than ten-thousandths) is not obtainable because the frequency ratio of the forks cannot be continuously maintained an exact integer."

Freely vibrating forks are the most accurate, obviating the intrinsic errors of the self-driven forks and in the forks driven by master forks. The best vibrating forks can maintain their rate almost exactly as they are electrically driven. By proper calibration the only inaccuracies which might be found in vibrating forks can be practically eliminated.

COMBINATIONS OF VARIOUS DEVICES

The *kymograph and tuning fork* method is primarily a laboratory device. A vibrating tuning fork used on the smoked drum of a kymograph is, however, one of the best methods of obtaining a graphic record of short-time intervals. [4] The drum can be set to revolve at a desired speed. The event to be timed should directly induce the contacts on the drum; this can be accomplished by a writing point which is attached to a signal magnet. Time can then be determined by counting the vibrations which the tuning fork, whose frequency is known, has traced on the smoked paper between the contact points made by the writing point. An example of this method of timing in physical education is that of Beise and Peaseley. [18]

Although all the devices cited in this survey are used in measuring time intervals, "the common method of timing high-speed events is to obtain two records: one showing the occurrence of the event to be timed, the other a parallel record of time elapsed." [19] A very good record is obtained by using a motion picture camera with a rapid rate of taking pictures and including in the picture an electrically driven clock. Having the picture of the performance, one can note on the clock the time at the beginning and the end of the event to be timed. If the actual speed of the event is then desired, it will be equal to distance travelled divided by the time elapsed. *Placing a clock in the field of the camera* is one satisfactory method of recording both an event and its time element.

The Bell and Howell Company has perfected a camera especially designed for micromotion study. A fast-moving stop watch, which is in the range of the camera lens, is a part of the apparatus contained in the camera. The camera is so arranged that the face of this watch is photographed on the film at each exposure; the time therefore is always kept in the picture.

Kirby and the Bell Telephone Laboratories have developed an identical idea, that of combining a high speed motion picture camera equipped with two lenses and a motor driven clock mechanism for the purpose of judging races. The perfected instrument is called the *Kirby Two-Eyed Camera.* The time standard of this system is a clock which is driven by a synchronous motor to which it is attached by means of

an electromagnetic clutch. The motor is driven by a 200–cycle tuning fork generator. The clock is started automatically through a synchronous motor when the starting pistol is fired. The motion picture camera is operated only as the runners finish the race; the specially constructed camera then takes two pictures simultaneously, one of the runner and the other of the clock. Both the performance and the time are thus recorded.[2,20]

The *"Multiple Eye"*[21] timer was developed by Ralph Powers for timing horse races. A "wall" of light is provided by five phototubes mounted one above the other. When the light is intercepted at any point, the phototube relay actuates two cameras, a still and a high speed motion picture camera which take the finish of the race.

There are two other photographic combinations; these differ decidedly from the methods just discussed because of the elimination of the clock and the substitution of other timing devices. One of these methods for accurately measuring short-time intervals is discussed in a scientific paper of the Bureau of Standards. A minute *time-scale is ruled off on film* which is used in a high speed camera. "The time scale is obtained by throwing flashes of light on the film, the interval between flashes being governed by the prongs of a tuning fork."[15] The type of tuning fork system used is a fork driven by a master fork; a 500–cycle fork is driven by impulses from a 100–cycle fork. This high frequency makes it possible to record time in intervals of thousandths of a second. According to Curtis and Duncan, time can be read from the film with an error not exceeding one ten-thousandth of a second, and by employing a comparator the error can be reduced to a few millionths of a second !

A race time developed at Cornell gives not only a record of the complete race, but also a record of given intervals. The arrangement consists of a number of coils which are set along the track at regular intervals. All these coils are connected to a galvanometer, the movements of which are photographically recorded. A thin magnet which is tied around a runner's waist induces a current in each coil. It can be seen that this timer gives a comparative record of a number of short intervals as well as an accurate record of the total time. Records can be read to 1/100 or 1/200 of a second.[22,23]

BIBLIOGRAPHY

1. Cureton, Thomas K., and David E. Coe. "An Analysis of the Errors in Stop Watch Timing," Research Quarterly, May, 1933, 94–109.
2. Fetter, Charles H. "A New Way of Splitting Seconds," *Bell Telephone Quarterly*, October 1932, 293–300.
3. Welser, Lyle. "A Practical Electro-Mechanical Race Timer," Research Quarterly, December, 1933, 97–107.
4. Cureton, Thomas K. *Physics Applied to Health and Physical Education* (2nd ed., Springfield College, Springfield, Mass., 1936) 33–34.

5. Robinson, T. R. "Novel Race Timing Clock for a Greyhound Racing Track," *Electrical Review,* 122:166 (F 4, 1938).
6. "Gillet and Johnston Race Timing Clock," *Engineer,* 165:192 (F 18, 1938).
7. Mogensen, Allan H. *Motion and Time Study* (New York: McGraw-Hill Book Company, 1932) 87–88.
8. Klopsteg, Paul E. "The Measurement of Very Short Time Intervals," *Physical Review,* 15 (Jan. 1920) 12–23.
9. Whopple, R. S. "Instruments in Science and Industry," *Engineer,* 168:321 (S 29, 1939); 148:355 O 6, 1939).
10. "Thousandths of a Second Timing for Racing," *Illuminating Engineering Society Transactions,* 32:775 (S 1937).
11. "General Electric Vacuum Tube Timer for Machines," *General Electric Review,* 41:297 (June, 1938).
12. Holmes, Walter G. *Applied Time and Motion Study* (New York: Ronald Press Co., 1938).
13. Burpee, R. H., and W. Stroll. "Measuring Reaction Time of Athletes," RESEARCH QUARTERLY, March, 1936, 110–118.
14. Elbel, E. R. "A Study in Variations in Response Time," RESEARCH QUARTERLY, March, 1939, 35–50.
15. Curtis, H. L., and R. C. Duncan. "A Method for the Accurate Measurement of Short Time Intervals," Scientific Paper of Bureau of Standards, No. 470, April 26, 1923, 28.
16. Cuykendall, T. R. "Method for the Determination of Very Short Time Intervals," *Cornell Engineer,* 3:7–10 (Oct. 1937).
17. Edgerton, H. E. "High Speed Motion Pictures," *School Science and Mathematics,* 35:646–647 (June 1935).
18. Beise, Dorothy, and Virginia Peaseley. "The Relation of Reaction Time and Speed," RESEARCH QUARTERLY, March, 1937, 133–142.
19. Diedrichs, H., and W. Andrae. *Experimental Mechanical Engineering* (New York: John Wiley and Sons, 1930) 47.
20. Fetter, C. H., and H. M. Stoller. "Precise Timing of Sporting Events," *Transactions of America Institute of Electrical Engineering,* June, 1933, 386–391.
21. "Elaborate Horse Race Timer Uses Five Photo Tubes," *Electronics,* 10:34–35 (April 1937).
22. Hill, A. V. *Living Machinery* (New York: Harcourt, Brace and Co., 1927) 230–232.
23. Hill, A. V. *Muscular Movement in Man* (New York: McGraw-Hill Book Co., 1927) 53–57.

A Simplified Method of Classifying Junior and Senior High School Boys Into Homogeneous Groups for Physical Education Activities

By Edgar Stansbury
Department of Physical Education
Western Kentucky State Teachers College
Bowling Green, Kentucky

A GREAT deal of work has been done in recent years by physical educators in an effort to arrive at objective methods for the classification of students into homogeneous groups for physical education activities.

Five of the many perplexing problems which must be considered before a battery of tests for this purpose can be adopted are: (1) the tests must not be too time-consuming, (2) the tests must place the individuals in the proper homogeneous groups, (3) the testing apparatus should be as inexpensive as possible, (4) the testing elements must hold an interest for those tested, and (5) last but not least, each test must have a high degree of validity.

The data for this study came from an unpublished master's thesis* in which the investigator studied the relative value of certain motor tests in predicting general motor ability of junior and senior high school boys.[3]†

SOURCE OF DATA

Nineteen tests were given to 390 boys; the tests administered were: (1) the six elements of the Rogers strength test battery,[11] (2) the Sargent jump,[10] (3) the 16-lb. shot-put, (4) the obstacle race, (5) the baseball throw, (6) the 8-lb. shot, (7) the 20-foot rope climb, (8) the running high jump, (9) the running broad jump, (10) the 75-yard dash, (11) the diamond run, (12) the running hop, step, and jump, and (13) the standing broad jump.

The author selected from this group of tests a short battery composed of the following tests: the 75-yard dash, standing broad jump, 8-lb. shot, and the running high jump. These tests were found to be the best predictors of all-round athletic ability. Scoring tables were constructed for tests 2, 3, 4, 5, 6, 7, and 13.[3] The T-score technique was used to equalize the relative scores, but instead of using a range of

* The author is indebted to Dr. C. H. McCloy at whose suggestion this study was initiated, and to Mr. Ray Donels who gave the tests.

† Superior figures refer to numbered Bibliography at end of article.

ten standard deviations, a range of six standard deviations was utilized.[3] For this study, however, the writer has included tables of indices for determining the relationship of an individual's performance with an established norm for his same general size and maturity.*

PREVIOUS STUDIES

Probably the simplest plan for classification is McCloy's classification index, which is based on age, height, and weight (20 [age in years]† plus 6 [ht. in inches] plus 1 [wt. in lbs.]).[6] This particular test gives no indication of a student's physical status, but it is useful on account of the close connection between physical ability and age, height, and weight. The Brace test[1] and its Iowa revision[8] measure physical ability well; however, students improve on these tests with practice. Different kinds of physical education programs would greatly influence the results of the tests. The Johnson tests[4] are good, but they are difficult to administer and to score, and they are quite time-consuming. McCloy's[8] general motor capacity tests and his general motor ability tests are very good for measuring the physical status of students, but they involve the use of several previously named tests and they are not economical in the use of time. The Sargent jump[10] is not by itself a good all-round test, and it is difficult to compare students for grouping on the basis of this test alone.

Rogers[11] has suggested some very interesting and instructive procedures for getting homogeneity of student groupings for physical education activities through the use of strength tests. His test in the form of the Strength Index, while it measures strength mainly, may also be useful for classification purposes if used properly, but the apparatus with which these strength tests are given is too expensive for many schools. He also suggests the classification of students by the use of the P.F.I., and he insists that such classification accomplishes segregation in terms of both present and future health needs. Rogers states that crude strength (strength index) is a measure of general athletic ability and that the P.F.I. is directly a measure of an individual's large muscle activity habits relative to others of his age and weight. McCloy[9] reminds us that strength tests measure general strength and that they measure nothing else, but at the same time he hastens to inform us that strength is probably the one most important item in almost all motor performance except in so far as such motor performance depends upon learned skills. Statistically speaking, one can assume that any test, whatever it may be, is useful only to the extent that it meets

---

* $\text{Score values} = \dfrac{\text{S.D. (T-50)}}{16\frac{2}{3}} + \text{M}$

$\text{T-score values} = 50 + 16\frac{2}{3}\,\dfrac{\text{(Score-mean)}}{\text{S.D.}}$

† For all ages above 17, use 17 as the age to be multiplied by 20.

the all-important statistical yard stick, validity. Rogers has validated his S.I. as a classifier by correlating it against an index of general athletic ability (total score for several track and field tests).

In this study, the best zero-order correlation of strength index against total points is .61; whereas, the multiple correlation of standing broad jump and 8-lb. shot-put against total points is .90. The equipment necessary for the administering of the latter battery of tests is almost nil when compared with that needed for strength testing; all that is needed is an 8-lb. shot and a tape. The tests are simple and cheap, and the results can readily be scored by simply referring to the scoring table. Copies of the scoring tables can be mimeographed and the boys can score their efforts on the spot.

Some of the other more recent investigators who have made studies relating to classification are: Cozens for college men,[2] Kistler for junior and senior high school boys,[5] Johnson for high schools boys,[4] and Wear for junior high boys.[12]

ANALYSIS OF DATA

By the use of certain statistical procedures, a method has been devised which meets the criteria mentioned in the introduction of this study. The multiple regression equation was used to give the constants necessary to weight the variables used in such a means of classification. Multiple correlations were performed to find the best combinations of events to predict total points* and the strength index.

(By careful observation, one can see easily the significance of certain associations of variables in the tables below.)

The variables in Battery *A* with strength index included tell nothing more than do the variables in Battery *H* with strength index eliminated, and they measure this ability much more validly than does any combination of strength tests alone (Battery *B*). The variables in *F* with both weight and S. I. eliminated tell about the same as do the

TABLE I

Results of Multiple Correlation with Total Points (14 events)	Zero-Order Correlations
Battery A	$r_{01} = .7861$
$X_0 =$ total points	$r_{02} = .8280$
$X_1 =$ shot-put (8 lb.)	$r_{03} = .3271$
$X_2 =$ standing broad jump	$r_{04} = .6087$
$X_3 =$ weight	$r_{12} = .5971$
$X_4 =$ strength index	$r_{13} = .5556$
$R_0 \quad .1234 = .9137$	$r_{14} = .6745$
	$r_{23} = .2402$
	$r_{24} = .5012$
	$r_{34} = .7651$

* Composite score of events [part of 1, i.e., (*a*) right grip, (*b*) left grip, (*c*) back lift, (*d*) leg lift, (*e*) dips, and (*f*) chins, 2, 3, 5, 6, 8, 9, 10, and 11] are named in the first paragraph under the heading "Source of Data."

TABLE I (Cont'd)

Results of Multiple Correlation with Total Points (14 events)	Zero-Order Correlations
Battery B	$r_{01} = .6485$
	$r_{02} = .6310$
$X_0 =$ total points	$r_{03} = .4178$
	$r_{04} = .4382$
$X_1 =$ grips (right and left)	$r_{05} = .4574$
	$r_{12} = .7464$
$X_2 =$ back lift	$r_{13} = .4681$
	$r_{14} = .7087$
$X_3 =$ leg lift	$r_{15} = .6690$
	$r_{23} = .6016$
$X_4 =$ chinning	$r_{24} = .6975$
	$r_{25} = .6821$
$X_5 =$ dips	$r_{34} = .5828$
	$r_{35} = .5652$
$R_0 \quad .12345 = .7039$	$r_{45} = .9491$
Battery C	$r_{06} = .3256$
$X_0 =$ total points	$r_{16} = .6146$
$X_1 =$ grips (right and left)	$r_{26} = .6400$
$X_2 =$ back lift	$r_{36} = .5006$
$X_3 =$ leg lift	$r_{46} = .9248$
$X_4 =$ chins	$r_{56} = .9455$
$X_5 =$ dips	
$X_6 =$ weight	
$R_0 \quad .123456 = .7514$	
Battery D	$r_{01} = .5487$
$X_0 =$ total points	$r_{02} = .4865$
$X_1 =$ age	$r_{12} = .4813$
$X_2 =$ height	$r_{13} = .4983$
$X_3 =$ grips (right and left)	$r_{23} = .7322$
$R_0 \quad .123 = .6975$	
Battery E	$r_{13} = .4681$
$X_0 =$ total points	$r_{23} = .7322$
$X_1 =$ age	
$X_2 =$ height	
$X_3 =$ weight	
$R_0 \quad .123 = .5706$	
Battery F	$r_{01} = .7861$
$X_0 =$ total points	$r_{02} = .8280$
$X_1 =$ shot-put (8 lb.)	$r_{12} = .5971$
$X_2 =$ standing broad jump	
$R_0 \quad .12 = .8975$	
Battery G	$r_{02} = .6796$
$X_0 =$ total points	$r_{12} = .4531$
$X_1 =$ shot-put (8 lb.)	
$X_2 =$ Sargent jump	
$R_0 \quad .12 = .8665$	
Battery H	$r_{13} = .5556$
$X_0 =$ total points	$r_{23} = .2402$
$X_1 =$ shot put (8 lb.)	
$X_2 =$ standing broad jump	
$X_3 =$ weight	
$R_0 \quad .123 = .9058$	

TABLE II

Results of Multiple Correlation with Strength Index	Zero-Order Correlations
Battery I	$r_{01} = .6745$
X_0 = strength index	$r_{02} = .4012$
X_1 = shot-put (8 lb.)	$r_{03} = .7651$
X_2 = Sargent jump	$r_{12} = .4531$
X_3 = weight	$r_{23} = .2010$
$R_0\ .123 = .8336$	
Battery J	$r_{02} = .5012$
X_0 = strength index	$r_{13} = .5971$
X_1 = shot put (8 lb.)	
X_2 = standing broad jump	
X_3 = weight	
$R_0\ .123 = .8427$	
Battery K	
X_0 = strength index	
X_1 = shot put (8 lb.)	
X_2 = Sargent jump	
$R_0\ .12 = .6830$	
Battery L	
X_0 = strength index	
X_1 = shot-put (8 lb.)	
X_2 = standing broad jump	
$R_0\ .12 = .6856$	

variables in *A*, the difference being .0062 which is significant in so far as classification of students is concerned. The substitution of the Sargent jump for standing broad jump in Battery *G* only lowers the values of *R*. This fact is again brought to our attention in Batteries *I* and *J*. Battery *J* will give more for the money than will either *I*, *K*, or *L*. In *I* and *J*, it seems that weight plays an important part for raising the *R* as contrasted with *K* and *L*. In view of these findings, the following simplified formulae are suggested as a means for classifying junior and senior high school boys for physical education activities.*

Battery F:

1. Classification by total points = 1.5 (8-lb. shot-put in feet) plus (standing broad jump in inches).

Battery H:

2. Classification by total points = 1.5 (8-lb. shot-put in feet) plus (standing broad jump in inches) — .06 (wt. in lbs.).

Battery J:

3. Strength index = 1.4 (8-lb. shot-put in feet) plus (standing broad jump in inches) plus (wt. in lbs.).

To obtain norms for these three batteries, two devices were tried:

* The formulae given below are made by eliminating the constants in the regressive equations and dividing them by another constant, usually the weighting for the broad jump.

the multiple correlations based on age and weight, and the Classification Index. The results were as follows:

(*P* equals points; *a*, age; *w*, weight; *s*, strength index)

Battery *F*	$R_{P.aw} = .5548$	$r_{PC} = .5963$
Battery *H*	$R_{P.aw} = .6326$	$r_{PC} = .6617$
Battery *J*	$R_{P.aw} = .8910$	$r_{SC} = .9010$

It will be seen that the Classification Index is in each case the superior measure. In the scattergrams, the regression was completely linear as well, which was not the case with weight. However, norms are computed for both Classification Index and age and weight.

For Batteries *F* and *H*, the quotient obtained will be much like McCloy's[6] Athletic Quotient, except that it will not be for as many events. For Battery *J*, more needs to be said. It will be remembered that this battery correlates .843 with the Strength Index, *which is much higher than the Strength Index correlates with the criterion used by Rogers*—which was total points. (Here the *r* is .609.) It is probable, therefore, that this battery measures strength almost as adequately as the Strength Index does—though it also measures velocity and power and hence is not a measure of pure strength alone. It is almost certain that it is a much better measure of motor ability, and it is certainly much more convenient to administer. The quotient would correspond fairly well to the P.F.I. and it is probably as useful. This should be a boon to schools not able to afford the apparatus for the testing of strength. It should be remembered that this study covers only the junior and senior high school range, and the findings are on boys only.

CONCLUSIONS

1. If the Strength Index is a good classifier of students for physical education activities, then with what has been found to be true here, the simple non-time-consuming procedures listed as Battery *F* will give one as good a classification without the elements of cost, with a minimum of time and administrative difficulties involved in a strength-testing program for such purposes.

2. With the use of the predicting formula indicated above, the cost of a strength testing program may even be eliminated entirely where economy is necessary, and instead, the physical fitness prediction may be made from the use of the established norms (Tables III, IV, and V).

Table III is used for general classification. The *F* norm divided into 100 times the score for individuals of the same general size and maturity gives a quotient which expresses the individual's capacity as a percentage of the norm.

TABLE III

POWER QUOTIENT A—F NORM
Classification Index (Junior and Senior High School Boys)
.1587 (C.I.) — 5.74

C.I.	Classification Index									
	0	10	20	30	40 (norms)	50	60	70	80	90
500	74	75	77	78	80	82	83	85	86	88
600	89	91	93	94	96	97	99	101	102	104
700	105	107	109	110	112	113	115	116	118	120
800	121	123	124	126	128	129	131	132	134	136
900	137	139	140	142	143	145	147	148	150	151
1000	153	156	157	158	159	161	162	164	166	167
1100	169	170	172	174	175	173	178	180	182	183
1200	185	186	188	189	191	193	194	196	197	199

Table IV gives better results than does Table III with boys who are markedly over- or underweight. It is used for general classification. The *H* norm divided into 100 times the score for individuals of the same general size and maturity gives a quotient which expresses the individual's capacity as a percentage of the norm.

TABLE IV

POWER QUOTIENT B—H NORM
Classification Index (Junior and Senior High School Boys)
.1763 (C.I.) — 12.022

C.I.	Classification Index									
	0	10	20	30	40 (norms)	50	60	70	80	90
500	76	78	80	81	83	85	87	88	90	92
600	94	96	97	99	100	103	104	106	108	110
700	111	113	115	117	118	120	122	124	125	127
800	129	131	133	134	136	138	140	141	143	145
900	145	148	150	152	154	155	157	159	161	163
1000	164	166	168	170	171	173	175	177	178	180
1100	182	184	185	187	189	191	192	194	196	198
1200	200	201	203	205	207	208	210	212	214	215

HOW TO USE THE TABLES

A boy 15 years old, 5′ 2″ in height and weighing 148 lbs. would have a classification index of 820. The classification index is found by substituting and multiplying the values in McCloy's classification formula, [20 (age in yrs.) plus 6 (ht. in inches) plus 1 (wt. in lbs.)]. Thus 20 (15) plus 6 (62) plus 1 (148) equals 820. By referring to Table III above, one finds 820 by observing the column on the left down to 800, next by following out the very top row to 20; where these two numbers (800 and 20) intersect, one finds 124, and this is the norm for this particular individual.

The same boy puts the 8-lb. shot 30 feet and broad jumps 79 inches. Battery *F* (page 769) classification by total points equals 1.5 (shot-put in feet) plus (standing broad jump in inches). By substituting and multiplying values, you

have 1.5 (30) plus (79) equals 124. $\frac{100 \times 124 \text{ (score)}}{124 \text{ (norm)}}$ equals 100. This quotient expresses the individual's ability as a percentage of the norm. In this respect (Battery *F*) this individual is "normal." A quotient above 100 would mean that the individual is above normal; whereas, a quotient below 100 would indicate the opposite.

Table V is used for measuring the relative strength of the boys. The *J* norm divided into 100 times the score for individuals of the same general size and maturity gives a quotient which expresses the individual's capacity as a percentage of the norm.

TABLE V

PHYSICAL EFFICIENCY INDEX—J NORM
Classification Index (Junior and Senior High School Boys)
.49701 (C.I.) — 165.03

C.I.	Classification Index									
	0	2	4	6	8 (norms)	10	12	14	16	18
500	83	84	85	86	87	88	89	90	91	92
520	93	94	95	96	97	98	99	100	101	102
540	103	104	105	106	107	108	109	110	111	112
560	113	114	115	116	117	118	119	120	121	122
580	123	124	125	126	127	128	129	130	131	132
600	133	134	135	136	137	138	139	140	141	142
620	143	144	145	146	147	148	149	150	151	152
640	153	154	155	156	157	158	159	160	161	162
660	163	164	165	166	167	168	169	170	171	172
680	173	174	175	176	177	178	179	180	181	182
700	183	184	185	186	187	188	189	190	191	192
720	193	194	195	196	197	198	199	200	201	202
740	203	204	205	206	207	208	209	210	211	212
760	213	214	215	216	217	218	219	220	221	222
780	223	224	225	226	227	228	229	230	231	232
800	233	234	235	236	237	238	239	240	241	242
820	243	244	245	246	247	248	249	250	251	252
840	253	254	255	256	257	258	259	260	261	262
860	263	264	265	266	267	268	269	270	271	272
880	273	274	275	276	277	278	279	280	281	282
900	283	284	285	286	287	288	289	290	291	292
920	293	294	295	296	297	298	299	300	301	302
940	303	304	305	306	307	308	309	310	311	312
960	313	314	315	316	317	318	319	320	321	322
980	323	324	325	326	327	328	329	330	331	332
1000	333	334	335	336	337	338	339	340	341	342
1020	343	344	345	346	347	348	349	350	351	352
1040	353	354	355	356	357	358	359	360	361	362
1060	363	364	365	366	367	368	369	370	371	372
1080	373	374	375	376	377	378	379	380	381	382
1100	383	384	385	386	387	388	389	390	391	392
1120	393	394	395	396	397	398	399	400	401	402
1140	403	404	405	406	407	408	409	410	411	412
1160	413	414	415	416	417	418	419	420	421	422
1180	423	424	425	426	427	428	429	430	431	432
1200	433	434	435	436	437	438	439	440	441	442

As a means of classification, this quotient is obtained in much less time, calculated much quicker, and administered more simply than is the P.F.I., and one has the assurance of a better classification if the correlation against the criterion is any indication of validity. Table IV is used in a similar manner, as is also Table V.

Table V, the Physical Efficiency Index (P.E.I.) will give results indicative of the boys' strength. As has been indicated elsewhere in this paper, the physical fitness can be predicted by merely using the established norms in Tables III, IV, and V. One must bear in mind that the P.F.I. was validated on a lower correlation than was either Battery *F*, *H*, or *J*. (Tables VI, VII, and VIII are self-explanatory.)

TABLE VI
F Norm

(If you wish to use only age and weight rather than the C.I., the norm will be found where the row to the right of the nearest weight meets the column under the nearest age.)

Wt.	Age in Years														
	12	12½	13	13½	14	14½	15 (norms)	15½	16	16½	17	17½	18	18½	19
220					32	135	137	139	142	144	146	149	161	153	156
210					131	133	135	138	140	142	145	147	150	152	154
200				127	129	131	134	136	139	141	143	146	148	150	153
190			123	125	127	130	132	135	137	139	142	144	146	149	151
180			121	124	126	128	131	133	135	138	140	142	145	147	149
170		117	120	122	124	127	129	131	134	136	138	141	143	146	148
160	113	116	118	120	123	125	127	130	132	134	137	139	142	144	146
150	111	114	116	119	121	123	125	128	131	133	135	138	140	142	145
140	110	112	115	117	119	122	124	127	129	131	134	136	138	141	143
130	108	111	113	116	118	120	123	125	127	130	132	134	137	139	141
120	107	109	112	114	116	119	121	123	126	128	130	133	135	138	140
110	105	108	110	112	115	117	119	122	124	126	129	131	134	136	138
100	104	106	108	111	113	115	118	120	123	125	127	130	132		
90	102	104	107	109	111	114	116	119	121	123					
80	100	103	105	108	110	112	115	117							
70	99	101	104	106											
60	97	100													

BIBLIOGRAPHY

1. Brace, David K. *Measuring Motor Ability* (New York: A. S. Barnes and Company, 1927).
2. Cozens, Frederick W. "The Measurement of General Athletic Ability in College Men," *University of Oregon Physical Education Series*, Vol. I, No. 3, University of Oregon, Eugene, Oregon, 1929.
3. Donels, Ray. "Evaluation of Selected Motor Tests as Predictors of General Motor Ability," unpublished thesis, University of Iowa, 1937.
4. Johnson, Granville. "Physical Skill Tests for Sectioning Classes into Homogeneous Units," Research Quarterly, 3:1 (March 1932).
5. Kistler, Joy. "A Comparative Study of Methods of Classifying Pupils into Homogeneous Groups for Physical Education," Research Quarterly, 5:1 (March 1934).
6. McCloy, C. H. *Tests and Measurements in Health and Physical Education.* (New York: F. S. Crofts and Company, 1939) 46.

TABLE VII

J Norm

(If you wish to use only age and weight rather than the C.I., the norm will be found where the row to the right of the nearest weight meets the column under the nearest age.)

Wt.	Age in Years														
	12	12½	13	13½	14	14½	15 (norms)	15½	16	16½	17	17½	18	18½	19
218						346	348	351	353	356	358	361	363	365	368
216						343	346	348	351	354	356	358	360	363	365
214						341	344	346	348	351	353	356	358	361	363
212					337	339	341	344	346	349	351	354	356	358	361
210					334	337	339	342	344	347	349	352	354	356	359
208					332	334	337	339	342	345	347	349	351	354	356
206					330	332	335	337	339	342	344	347	349	352	354
204					328	330	332	335	337	340	342	345	347	349	352
202					325	328	330	333	335	338	340	343	345	347	350
200				321	323	325	328	330	333	336	338	341	342	345	347
198				318	321	323	326	328	331	333	335	338	340	343	345
196				316	319	321	323	326	328	331	333	336	338	340	343
194			311	314	316	319	321	324	326	329	331	334	336	338	341
192			309	312	314	316	319	321	324	327	329	332	333	336	338
190			307	309	312	314	317	319	322	324	326	329	331	334	336
188			305	307	310	312	314	317	319	322	324	327	329	331	334
186		300	302	305	307	310	312	315	317	320	322	325	327	329	332
184		298	300	303	305	308	310	312	315	318	320	323	324	327	329
182		296	298	300	303	305	308	310	313	315	317	320	322	325	327
180		293	296	298	301	303	305	308	310	313	315	318	320	322	325
178	289	291	294	296	298	301	303	306	308	311	313	316	318	320	322
176	286	289	291	294	296	299	301	303	306	309	311	314	316	318	320
174	284	287	289	291	294	296	299	301	304	306	308	311	313	316	318
172	282	284	287	289	292	294	296	299	301	304	306	309	311	313	316
170	280	282	285	287	289	292	294	297	299	302	304	307	309	311	314
168	277	280	282	285	287	290	292	294	297	300	302	305	307	309	311
166	275	278	280	282	285	287	290	292	295	298	299	302	304	307	309
164	273	275	278	280	283	285	287	290	292	295	297	300	302	304	307
162	271	273	276	278	280	283	285	288	290	293	295	298	300	302	305
160	268	271	273	276	278	281	283	285	288	291	293	296	298	300	302
158	266	269	271	272	276	278	281	283	286	289	290	293	295	298	300
156	264	266	269	271	274	276	279	281	283	286	288	291	293	295	298
154	262	264	267	269	271	274	276	279	281	284	286	289	291	293	296
152	259	262	264	267	269	272	274	276	279	282	284	287	289	291	293
150	257	260	262	265	267	269	272	274	277	280	281	284	286	289	291
148	255	257	260	262	265	267	270	272	274	277	279	282	284	287	289
146	253	255	258	260	262	265	267	270	272	275	277	280	282	284	287

7. McCloy, C. H. "An Analytical Study of the Stunt Type Test as a Measure of Motor Educability," Research Quarterly, 8:3 (October 1937).
8. McCloy, C. H. *Tests and Measurements in Health and Physical Education.* (New York: F. S. Crofts and Company, 1939) 133.
9. *Ibid.*, 24.
10. McCloy, C. H. "Recent Studies in the Sargent Jump," Research Quarterly, 3:2 (May 1932).

TABLE VII (con't.)

Wt.	Age in Years														
	12	12½	13	13½	14	14½	15 (norms)	15½	16	16½	17	17½	18	18½	19
144	250	253	255	258	260	263	265	267	270	273	275	278	280	282	284
142	248	251	253	256	258	260	263	265	268	271	273	275	277	280	282
140	246	248	251	253	256	258	261	263	265	268	270	273	275	278	280
138	244	246	249	251	253	256	258	261	263	266	268	271	273	275	278
136	242	244	246	249	251	254	256	258	261	264	266	269	271	273	275
134	239	242	244	247	249	251	254	256	259	262	264	266	268	271	273
132	237	239	242	244	247	249	252	254	256	259	261	264	266	269	271
130	235	237	240	242	244	247	249	252	254	257	259	262	264	266	269
128	233	235	237	240	242	245	247	250	252	255	247	260	262	264	266
126	230	233	235	238	240	242	245	247	240	253	255	257	259	262	264
124	228	230	233	235	238	240	243	245	247	250	252	255	257	260	262
122	226	228	231	233	236	238	240	243	245	248	250	253	255	257	260
120	224	226	228	230	233	236	238	241	243	246	248	251	253	255	258
118	221	224	226	229	231	233	236	238	241	244	246	248	250	253	
116	219	221	224	226	229	231	234	236	238	241	243	246	248	251	
114	217	219	222	224	227	229	231	234	236	239	241	244	246		
112	215	217	219	222	224	227	229	232	234	237	239	242	244		
110	212	215	217	220	222	224	227	229	232	235	237	239			
108	210	213	215	217	220	222	225	227	229	232	234	237			
106	208	210	213	215	218	220	222	225	227	230	232	235			
104	206	208	210	213	215	218	220	223	225	228	230	232			
102	203	206	208	211	213	215	218	220	223	226	228				
100	201	204	206	208	211	213	216	218	221	223	225				
98	199	201	204	206	209	211	213	216	218	221					
96	197	199	201	204	206	209	211	214	216	219					
94	194	197	199	202	204	207	209	211	214						
92	192	195	197	199	202	204	207	209	212						
90	190	192	195	197	200	202	204	207	209						
88	188	190	192	194	197	200	202	205							
86	185	188	190	193	195	198	200	202							
84	183	186	188	190	193	195	198	200							
82	181	183	186	188	191	193	195	198							
80	179	181	184	186	188	191	193	196							
78	176	179	181	184	186	189	191	193							
76	174	177	179	181	184	186	189	191							
74	172	174	177	179	181	184	186								
72	170	172	175	177	179	182	184								
70	167	170	172	175	177	180	182								
68	165	168	170	172	175	177	180								
66	163	165	168	170	173	175	176								
64	161	163	166	168	170	173	175								
62	158	161	163	166	168	171									
60	156	159	161	163	166										

11. Rogers, Frederick Rand, *Test and Measurement Program in the Redirection of Physical Education*. (New York: Bureau of Publications, Teachers College, Columbia University, 1927) 58–59, 77–110.
12. Wear, Carlos L. "The Construction of a Multiple Obstacle Run for Classifying Junior High School Boys into Homogeneous Groups for Physical Education Activities," RESEARCH QUARTERLY, 11:2 (May 1940).

TABLE VIII

H Norm

(If you wish to use only age and weight rather than the C.I., the norm will be found where the row to the right of the nearest weight meets the column under the nearest age.)

Wt.	Age in Years														
	12	12½	13	13½	14	14½	15 (norms)	15½	16	16½	17	17½	18	18½	19
222					147	150	151	154	157	159	162	164	167	169	172
216					146	148	150	153	156	158	160	163	165	168	170
210				142	144	147	149	152	154	157	159	162	164	167	169
204				140	143	145	148	150	153	155	158	160	163	165	168
198			137	139	142	144	146	149	151	154	156	159	161	164	166
192			135	138	140	143	145	148	150	153	155	157	160	162	165
186		131	134	136	139	141	143	146	149	151	153	156	159	161	163
180		130	132	135	137	140	142	145	147	150	152	155	157	160	162
174		129	131	134	136	139	141	143	146	148	151	153	156	158	161
168	125	127	130	132	135	137	139	142	145	147	149	152	154	157	159
162	123	126	128	131	133	136	138	141	143	146	148	151	153	155	158
156	122	124	127	129	132	134	137	139	142	144	146	149	152	154	157
150	121	123	126	128	131	133	135	138	140	143	145	148	150	153	155
144	119	122	124	127	129	132	134	137	139	141	144	146	149	151	154
138	118	120	123	125	128	130	132	135	138	140	142	145	147	150	152
132	117	119	121	124	126	129	131	134	136	139	141	144	146	149	151
126	115	118	120	123	125	127	130	132	135	137	140	142	145	147	150
120	114	116	119	121	124	126	128	131	133	136	138	141	143	146	148
114	112	115	117	120	122	125	127	130	132	135	137	139	142	144	147
108	111	113	116	118	121	123	126	128	131	133	135	138	141	143	146
102	110	112	115	117	119	122	124	127	129	132	134	137	139	142	144
96	108	111	113	116	118	121	123	125	128	130	133	135	138	140	
90	107	109	112	114	117	119	121	124	127	129	132	134	136		
84	105	108	110	113	115	118	120	123	125	128	130	133			
78	104	107	109	111	114	116	119	121	124	126	129				
72	103	105	108	110	113	115	118	120	122	125					
66	101	104	106	109	111	114	116	119	121						
60	100	102	105	107	110	112	115	117							

A Preliminary Study of the Validity and Reliability of the City College Physical Proficiency Test

By Gerald Ehrlich

Hygiene Department of the City College of New York
Assisted by J. J. Dailey, H. Djorup, Wm. O. Frankle, H. Parker, J. S. Peace, R. F. Purcell

ANALYSIS OF THE PROBLEM

THIS study was undertaken to determine (1) the validity and reliability of the City College of New York Physical Proficiency Test, and (2) whether the time required for the administration of the test can or cannot be decreased without affecting its value as a method of classifying students.

Background of the Study.—The present investigation is a continuation of previous research completed on the City College Physical Proficiency Test. In 1940, Sperling determined the relation between the above test battery and the Rogers Physical Capacity Tests, and concluded that the former had definite value for classification purposes.[1] Up to the present time, however, while the Department of Hygiene has utilized this device with satisfactory results, there has been no experimental evidence with regard either to its validity or its reliability.

The primary purpose of the test is the classification of students for instruction in a program of physical education activities, where the program stresses two broad areas, namely, development of motor and athletic skills and development of organic power. Originally the test was constructed on the basis of experience with various test items. A group of events consisting of chins, dips, bar vault for height, 100-yard dash, and the running broad jump was *accepted* as being a valid means of classification, although it was clearly understood that the test did not offer detailed information about the student. It appeared to offer an adequate screening test, however, and met almost all the limitations to which the program was exposed. To date there has been no analysis to substantiate the rather subjective method of its construction other than the observations of instructors in charge of various classes and the study completed by Sperling. Therefore the underlying purposes of the present study are (1) scientific evaluation and (2) an attempt to bring to light whatever weaknesses exist in the test battery.

[1] A. Sperling, "Comparison of the Rogers Test and the City College of New York Physical Proficiency Test as Bases for Classifying Students for Activity in Physical Education," Research Quarterly, 11:1 (March 1940) 144–149.

PROCEDURE

Administration of the Tests.—One complete freshman class, numbering 252 students, was used for the study. Five instructors who were thoroughly familiar with the test administered and scored the battery.* It was given twice during the semester with a period of seven weeks elapsing between the administration of the first and second tests.

The procedure used for the first test followed the technique that has been utilized for all classes, namely, scoring and recording the results within four or five class periods. Chins, dips, and standing broad jump were given on one day, the vault and track were given the following period, and subsequent periods were used to obtain data for students who registered at a late date or were absent at the beginning of the term. The following method was used in administering the test for the second time. The class was divided into five groups of approximately forty students per group. Each group was then assigned to one test item to be taken only during that specific period. Each of the five instructors scored one event; thus one instructor scored the chins, one instructor scored the track event, etc. At the end of the first period each group had been examined, but each group had completed a different event. The next period the groups were rotated but the instructors remained at the same testing area, so that at the end of five periods each group had been tested on all of the five events. This method permitted an estimation of the time required for the administration of the various items and the information obtained was used later as a basis for eliminating an event. Cards were prepared on which the student's score was recorded and the data were later transcribed to a set of master sheets. Incomplete data were discarded and the total number of subjects finally used in the statistical treatment numbered 202.†

Two changes in the test battery were made in the present study. The vaulting bar was set at a height of 2′ 6″, and raised 1″ at a time. The previous starting height of 3′ 6″ tended to restrict the differentiation of ability below this height. The second change involved the substitution of the standing broad jump for the running broad jump. It was noticed that many students had little or no previous experience in the running broad jump and that far too many leg injuries were occurring in spite of all precautionary measures. The standing broad jump was administered and recorded in the following manner. A warm-up trial was permitted, after which the student toed the mark on

* A complete description of the administration and method of scoring the test is given in Sperling's original article.

† The lack of standardization in the administration of the test battery is brought to the reader's attention. When the size of the class is large, it is impossible to complete all events within the regularly assigned period. Some students may be required to take three items in one period while others may take but one item in one period, all depending upon the ease of administration of test items. Acknowledge of this defect in experimental conditions is made at this point since one of the underlying purposes of the study is to bring to light whatever weaknesses exist in the test battery.

a rubber mat 3′ x 15′. The jump was measured to the nearest inch from the starting line to the point where the heel touched; two trials were given and the best of the two jumps accepted.

Establishment of the Criterion.—Assuming that the factors upon which the classification plan was based consisted of a combination of athletic ability and strength, a seven-step rating scale was constructed in order to evaluate the subjects. Each step of the rating scale stood for a possible group in which a student might be placed (Table I). The percentages indicate the number of subjects that one would expect to find within each group on the basis of subjective judgment. The numbers 1 through 7 are the numerical values which were assigned

TABLE I

RATING SCALE FOR EVALUATING STUDENTS

7. (1 per cent)	Very outstanding material, approximately varsity calibre
6. (6 per cent)	Excellent but not quite outstanding
5. (24 per cent)	Above average
4. (38 per cent)	Average
3. (24 per cent)	Below average
2. (6 per cent)	Very poor
1. (1 per cent)	Poorest

to each category. Thus, if a student was rated as "very poor," he received a numerical value of 2; a man who was rated as "above average" was given a numerical value of 5. The technique used in rating the class took into consideration certain fundamental limitations. First, it was clearly understood that results obtained by the use of the rating scale could not be accepted as conclusive. They would merely indicate a trend toward more positive confirmation. Second, definite preconceived attitudes in relation to the adequacy of the test could not be completely eliminated. A jury of seven instructors was selected, however, each one of whom had had a minimum of six years of experience with the present test battery and who were thoroughly familiar with the purpose of the study. Problems and methods of rating were discussed and explained so that each individual had a sound understanding of the rating scale. A system was evolved whereby each rater had ample opportunity to observe the subjects in some type of activity for an extended period of time. The subjects were rotated so that at the end of five periods the entire class had been rated. When the data were collected each subject had seven scores, each score representing a different individual's rating. The seven scores were totalled and this total used as the criterion score. Since there were seven categories or classification units, the maximum score a subject could obtain was 49 and the minimum score 7; all other totals were included within these limits.

Determination of Reliability.—Since the test battery was administered twice during the term, the composite scores of the first test were correlated with the composite scores of the second test. In order to facilitate the treatment of the data, T-score tables were constructed for each event and all raw scores transformed into derived scores. This procedure enabled the raw scores of the five events to be added, gave a composite score, and these subsequently were used in computing multiple correlation coefficients.

STATISTICAL ANALYSIS

Before determining the validity and reliability of the test battery, each test item was analyzed from the point of view of (*a*) central tendency, (*b*) variability, (*c*) reliability of sampling, and (*d*) normality of distribution. These results are contained in Table II. The Chi-Square

TABLE II

MEASURES OF CENTRAL TENDENCY—VARIABILITY—ERRORS OF SAMPLING AND CHI-SQUARE TEST FOR NORMALCY OF DATA

Event	Mean	σ_m	σ	σ_σ	*P* Value
Dips	5.59	0.26	3.72	0.18	7.2
Chins	4.81	0.20	2.83	0.14	39.8
Track	14.48	0.67	0.95	0.05	3.7
Vault	53.94	0.61	8.95	0.47	3.6
S.B.J.	85.21	0.62	9.05	0.44	84.8

test was used to determine goodness-of-fit; the reason for this step lay in the fact that types of curves commonly met with in physical education activities have not been subjected to careful scrutiny and their backgrounds are somewhat obscure. Rather than assume a normal distribution for purposes of constructing scoring tables, the writer was of the opinion that an analysis of the forms of the curves might lead to the proper mathematical bases. Inspection of the *P* values indicates rather definitely that any assumption of normality of distribution is unwarranted.

Of more than passing interest are the data obtained on chins and dips. These items were scored by recording the number of chins or dips actually completed. Therefore a large number of subjects who could neither chin nor dip once were scored as zero achievement. Two important factors were therefore disregarded, the weight and relative musculature of the individual. If some other method of scoring the two events was employed, it would then have been possible to differentiate more clearly among individuals of so-called zero achievement. Theoretically every individual possesses some degree of chinning and

dipping strength, but the method of scoring that has been utilized heretofore falls short by failing to recognize these qualities.*

The administration of the bar vault for height has always consumed much time. The second administration of the test indicated that it required as much as half the time necessary for the entire test. In addition to this difficulty the event has proved to be dangerous in that inexperienced students are exposed to serious injuries. This point and the element of testing difficulty constituted two essential reasons for discarding this item from the battery.

Validity of the Test Battery.—Before proceeding to the analysis of the validity of the test itself, the reliability of the ratings was investigated by correlating the ratings of one individual against those of another individual. This technique is suggested by McCloy.[2] Table III summarizes the results of the intercorrelations.

TABLE III

RELIABILITY COEFFICIENTS OF RATINGS

Rater	σ_c	A	B	C	D	E	F
A	0.825						
B	0.729	0.470					
C	0.794	0.745	0.450				
D	0.776	0.468	0.504	0.525			
E	0.583	0.380	0.376	0.303	0.356		
F	0.652	0.563	0.381	0.546	0.375	0.345	
G	0.830	0.655	6.568	0.596	0.658	0.387	0.540

The correlations between each single rating and the composite criterion score range from 0.583 to 0.825. Actually these coefficients are high; however the values must be accepted as being spurious in nature since the composite score contains a measure that is common to both variables, the ratings that were correlated with the criterion score. Theoretically, then, the values are really lower than given in the table. The intercorrelations of the single ratings indicate a uniform trend toward reliability since it is known that reliability depends upon the

* The writer, using the same test data, scored dips and chins by McCloy's formula and obtained a *P* value of 82.8. The data may therefore be accepted as being a close fit to the normal curve. McCloy's method considers factors of weight and relative musculature and is more thorough in scoring these events than the technique that has been used in this study. Another departmental study is under way that is revising the present method of scoring and equating test items. The reader is referred to the following sources for further information regarding McCloy's formula for scoring chins and dips.

C. H. McCloy, *Tests and Measurements in Health and Physical Education* (New York: F. S. Crofts and Company, 1939) 22–24.

———, "A New Method of Scoring Chinning and Dipping," RESEARCH QUARTERLY, 2:4 (Dec. 1931) 132–143.

[2] McCloy, *op. cit.*, 210.

type of data used.[3] In this study a subjective element, the rating, was correlated against another subjective element and numerically low coefficients obtained. Taking into consideration the type of data, the coefficients should be accepted as indicating marked relationship rather than negligible relationship. Therefore the composite criterion scores were utilized with a reasonable degree of assurance in determining the validity of the test.

The next step consisted of analyzing the intercorrelations between the individual items and the criterion score. Two methods were used in order to obtain an accurate picture of association, the Pearson product-moment method and the Correlation Ratio. These results are contained in Table IV.

TABLE IV

TEST BATTERY INTERCORRELATIONS
USING THE PEARSON METHOD AND THE CORRELATION RATIO

Event	Criterion		Dips		Chins		Vault		S.B.J.	
	r	η	r	η	r	η	r	η	r	η
Dips	0.556	0.638								
Chins	0.524	0.589	0.678*	0.705						
Track	0.711	0.758	0.526	0.641	0.392	0.598				
Vault	0.734	0.779	0.605	0.691	0.595*	0.637	0.674	0.744		
S.B.J.	0.762	0.771*	0.533	0.676	0.592	0.676	0.737	0.777	0.668	0.740

* Denotes linear relationship.

The correlation ratio undoubtedly presents a more accurate picture of inter-relationships than does r. In only three cases may the association be described as linear; standing broad jump and the criterion score, chins and dips, and vault and chins. All others are definitely curvilinear. On the basis of the Chi-Square test, the standing broad jump closely approximates the normal curve and since the rating scale was constructed on the assumption that the qualities under consideration were normally distributed, the linear relation is not unexpected.

A coefficient of 0.678 between chins and dips not only appears to be high, but brings out more effectively the need for using a properly constructed scoring table. The large number of zero scores obtained in each event correlate perfectly with each other and so tend to increase not only the linearity but also the numerical value of the coefficient. In order to note differences in correlation coefficients, McCloy's method of scoring chins and dips was applied and a coefficient of 0.582 obtained, indicating that the value computed in this study is relatively high.

[3] H. E. Garrett, *Statistics in Psychology and Education* (New York: Longmans, Green and Company, 1938) 342–343.

The linear relation existing between chins and vault may be ascribed to a factor common to both events. In performing the vault the initial impetus is supplied by the legs with the arms aiding the rise of the body. Thereafter arm strength is important in guiding and controlling the body in its arc over the bar. The influence of arm strength in raising the body while executing a chin is apparent. It may be inferred then, that arm strength tends to be associated in linear fashion with ability in vaulting the bar; as arm strength increases, ability to vault also increases.

Using Kelley's Method of Successive Approximations,[4] a multiple correlation coefficient of 0.797 was obtained. In view of the fact that subjective ratings were used, an R of 0.797 is unusually high and indicates a very positive trend toward the validity of the test battery. It is not accepted as conclusive evidence but simply points the way toward more objective confirmation by the use of objective criteria.

Analysis of the Reliability of the Battery.—A coefficient of 0.924 was obtained by correlating the composite scores of the first administration of the test with the composite scores of the second administration of the test. This value is slightly lower than the value that might have been obtained had the two tests been given under similar conditions. It is known that chance errors of measurement tend to reduce r except when they are correlated.[5] Since the administrations differed in method, chance errors could not have been correlated. However, the reliability coefficient is high enough to warrant the use of the test as a consistent instrument of measurement.

Decrease in Administrative Time.—A second multiple correlation coefficient was computed, omitting chins and the vault. Chins were omitted on the basis of evidence supplied by Cozens [6] who states that dips on the parallel bars are an adequate measure of arm strength when used in a college level athletic ability test. As explained previously, the City College test has used both chins and dips, and with the presentation of this new evidence, opportunity was taken to omit chins. The vault was omitted because it correlates fairly well with track and standing broad jump. An R of 0.790 was obtained with the reduced battery, and differs but slightly from the coefficient obtained with the five-event battery. Therefore chins and vault could be omitted without seriously affecting the efficiency with which the remainder of the test items classified college students.

---

[4] T. L. Kelley, *Statistical Method* (New York: The Macmillan Company, 1924) 302–305.

[5] C. B. Davenport and M. P. Ekas, *Statistical Methods in Biology, Medicine and Psychology* (New York: John Wiley and Sons, 1936) 94.

[6] F. W. Cozens, "Strength Tests as Measures of General Athletic Ability in College Men," RESEARCH QUARTERLY, 11:1 (March 1940) 52.

SUMMARY AND CONCLUSIONS

1. The study had as its purpose the determination of the validity and reliability of the City College Physical Proficiency Test. Validity was established by the use of a rating scale; a validity coefficient of 0.797 was obtained. This coefficient, while high, should not be accepted as conclusive proof of the degree to which the test actually classifies students. It merely indicates the *possibility* of high validity and it is suggested that further investigation of validity be continued in order to confirm the results presented in this study.

2. Reliability was established by the re-test method and a coefficient of 0.924 obtained. This value presents adequate justification for the use of the battery as a consistent measuring instrument.

3. The study had, as its second purpose, the attempt to decrease the administrative time required for the test battery. A second validity coefficient of 0.790 was obtained with dips and vault excluded from consideration. It was established that the omission of these two events did not seriously affect the value of the test as a method of classification.

4. It is suggested that an intensive investigation be conducted to determine the law or laws in operation that distinguish specific types of curves in physical education activities. Such information might well result in confirming the work accomplished by McCloy and Cozens in this area.

Selected Bibliography for 1940

Compiled by G. B. AFFLECK
Springfield College, Springfield, Mass.

AQUATICS

Bryant, C. "Water Sport, a Pleasure and a Problem," *Beach & Pool,* 14 (Sept. 1940) 6.

Greenwood, F. A. (Comp.) *Bibliography of Swimming.* (New York: H. W. Wilson Co., 1940) 308 pp., $4.25.

Horton, B. T., and Gabrielson, M. A. "Hypersensitiveness to Cold: A Condition Dangerous to Swimmers," RES. QUAR., 11 (Oct. 1940) 119–25.

Manheimer, W. A. "Reducing Health Hazards in the Swimming Pool," *Jr. Health & Phys. Ed.,* 11 (Jan. 1940) 25–6, 62–3.

"New Rules in Water Polo," *Beach & Pool,* 14 (Feb. 1940) 12.

Silvia, C. E. "Life Saving and Water Safety Bibliography," grad. thesis, Springfield College, 1940, 274 pp.

Warner, D. E. "A Cinematographic Analysis of Swimming Strokes," grad. thesis, Springfield College, 1940, 56 pp.

CANOEING, BOATING, YACHTING

Baldwin, A. H. *Junior Skipper's Handbook.* (New York: Random House, 1940) 102 pp., $1.00.

Crosby, W. F. *Racing Small Boats.* (New York: Macmillan, 1940) 116 pp., $1.75.

Hills, G. E. *Sailing Rules in Yacht Racing.* (New York: Scribners, 1940) 342 pp., $3.00.

Kissner, J. *Foldboat Holidays.* (New York: Greystone Press, 1940) 316 pp., $2.50.

McCarthy, R. H. *Canoeing.* (New York: Pitman, 1940) 191 pp., $2.00.

DIVING AND SWIMMING

Basset-Lowke, J. *Swimming and Diving.* (New York: Pitman, 1940) 140 pp., $1.60.

Hummer, G. E. "How to Develop Champion Swimmers," *Beach & Pool,* 14 (Sept. 1940) 7.

Karpovich, P. V., and LeMaistre, H. L. "Prediction of Time in Swimming Breast Stroke Based on Oxygen Consumption," RES. QUAR., 11 (Mar. 1940) 40–4.

Kaufman, N. H. "How to Stage Swimming and Diving Meets," *Beach & Pool,* 14 (Aug. 1940) 12.

Lanoue, F. "Analysis of the Basic Factors in Fancy Diving, RES. QUAR., 11 (Mar. 1940) 102–9.

LeMaistre, E. H. "Metabolic Prediction of Speed in Breast Stroke Swimming," grad. thesis, Springfield College, 1940, 77 pp.

Lindberg, R. "The Butterfly Leg Kick," *Ath. Jr.,* 20 (Jan. 1940) 10–2.

Longfellow, W. E. "Water-Safety Program of the American Red Cross," *Beach & Pool,* 14 (Jan. 1940) 13.

Mann, M., *et al. Swimming.* (New York: Prentice-Hall, 1940) 102 pp., $2.00.

Official Rules for Swimming, Fancy Diving, Water Polo. (N.C.A.A.) (New York: Am. Sports, 1940) $0.35.

O'Rourke, J. J. "Analyzation and Execution of the Swan Dive," *Beach & Pool,* 14 (Sept. 1940) 10.

Plummer, C. R. "Cyclic Velocity Variations of the Breast and Butterfly Strokes," grad. thesis, Springfield College, 1940, 86 pp.

Stultz, N. B., *et al. Learning to Swim.* (New York: Holt, 1940) 65 pp., $1.00.

Tuttle, W. W., *et al.* "A Further Study of the Optimum Time for Holding a Swimmer on His Mark," RES. QUAR., 11 (Mar. 1940) 53–6.

Usman, A. "A Study of the Japanese Way of Swimming the Crawl," *Beach & Pool,* 14 (Jan. 1940) 12.

NATATORIA: CONSTRUCTION, OPERATION

Behrens, R. E. "Swimming Pool Designs," *Beach & Pool,* 14 (Feb. 1940) 8–11.

Clemenger, W. "Duties and Responsibili-

ties of the Aquatic Director," *Beach & Pool*, 14 (Mar. 1940) 9.

"Details of the Design and Operation of the Electric Springboard," *Beach & Pool*, 14 (May 1940) 9.

Roos, C. M. "Promotion of a Swimming Pool," *Beach & Pool*, 14 (April 1940) 8–9.

"Specifications and Recommendations of Underwater and Overhead Lighting," *Beach & Pool*, 14 (Mar. 1940) 5–8.

Vockenson, L. F., *et al.* "Pool Facilities Are Public Necessities, *Beach & Pool*, 14 (Jan. 1940) 7–11.

Wagner, E. P. "Construction of a Swimming Pool," *Beach & Pool*, 14 (April 1940) 13–4.

ATHLETICS, SPORTS, OUTDOOR ACTIVITIES

Boniface, J. J. *Riding: A Manual of Horsemanship for Beginners.* (New York: Barnes, 1940) 89 pp. $1.00.

Dalthorp, C. J. "Athletics for All," *Ath. Jr.*, 21 (Sept. 1940) 39–40.

Connecticut Walk Book. (New Haven: E. L. Heermance, 1940) $0.50.

Farrell, V. "Softball as I See It," *Jr. Health & Phys. Ed.*, 11 (Mar. 1940) 151, 195–7.

Geist, R. C. *Bicycling as a Hobby.* (New York: Harpers, 1940) 163 pp., $2.00.

Gilkeson, G. "The Coach and the Public," *Ath. Jr.*, 21 (Sept. 1940) 13, 42.

Graham, S. *The Gentle Art of Tramping.* (Toronto: Nelson, 1940) 215 pp., $1.00.

Grau, F. V. "Chemical Weed Control as an Aid in Renovating Turf on Athletic Fields," *Ath. Jr.*, 20 (April 1940) 22, 38–41.

Hawley, G. *An Anatomical Analysis of Sports.* (New York: Barnes, 1940) 191 pp., $3.00.

Kjellstrom, L. S., *et al.* "Hockey for Beginners," *Jr. Health & Phys. Ed.*, 11 (Oct. 1940) 486–7, 515–6.

Leacock, S. "Cricket for Americans," (humor) *Atlan. Mo.*, 165 (June 1940) 766–9.

McNeill, H. A., Jr. (ed.) *The Blue Book of College Athletics.* (Cleveland: McNitts, Inc., 1940) 284 pp., $1.50.

"New Rules for Polo," *Country Life*, 77 (Jan. 1940) 33, 56–7.

Official Individual Sports Guide, Archery, Tennis, Riding, Golf. (New York: Barnes, 1940) $0.50 (pa. $0.25).

Official Lacrosse Guide. (New York: Am Sports, 1940) $0.35.

Porter, H. V. *H. V.'s Athletic Anthology: High Lights of Gridiron, Track, and Court in Verse and Prose.* (Danville, Ill.: Interstate, 1939) 247 pp., $2.00.

Spalding's Official Athletic Almanac. (New York: Am. Sports, 1940) $0.35.

Stanwick, T. *Lacrosse.* (New York: Barnes, 1940) 92 pp., $1.00.

Administration, Operation, etc.

DuBois, K. B. "Equalizing Opponents by Means of the Strength Index," *Education*, 60 (April 1940) 520–4.

Clark, L. W. "Athletics and Sportsmanship: Policies and Techniques," *Education*, 60 (April 1940) 517–20.

Johnson, F. P. "Administration of a Relay Meet," *Ath. Jr.*, 20 (April 1940) 9, 44–7.

Lee, S. A. "Varsity Athletics Sponsor Intramural Athletics," *Ath. Jr.*, 20 (June 1940) 8–9, 42.

"Loudspeakers, Hints for Their Installation and Use," *Ath. Jr.*, 21 (Sept. 1940) 60–3.

Webster, F. *Sports Grounds and Buildings: Making, Management, Maintenance and Equipment.* (New York: Pitman [agent], 1940) 323 pp., $6.00.

Archery

Archery: How to Make and Use Tackle. (New York: Boy Scouts of America, 1940) 72 pp., $0.20.

Besco-Layer, O. *Archery.* (Clarendon Hills, Ill.: Author, 1940) 48 pp., $0.50.

Miller, M. K. "Archery in the Physical Education Program," *Jr. Health & Phys. Ed.*, 11 (Oct. 1940) 480–3, 516–8.

Reichart, N., and Keasey, G. *Archery.* (New York: Barnes, 1940) 95 pp., $1.00.

Baseball

Baseball in Old Chicago. (Chicago: McClung, 1939) 64 pp., $0.50.

"Baserunning and Sliding Illustrated," *Ath. Jr.*, 20 (Mar. 1940) 10–3.

Brown, C. O. "Changes in the Baseball

Rules for 1940," *Ath. Jr.*, 20 (Mar. 1940) 8–9.

Daher, J. C. "Review of Pitching Fundamentals," *Ath. Jr.*, 20 (May 1940) 15, 48–9.

DeGroat, H. S. "Baseball Backstops and Batting Cages," *Ath. Jr.*, 20 (Feb. 1940) 32–4, 43–4.

Epler, S. "Try Six-Man Baseball," *Jr. Health & Phys. Ed.*, 11 (June 1940) 367.

Evans, W. G. *How to Umpire.* (New York: Am. Sports, 1940) $0.35.

Foster, J. B. *How to Bat.* (New York: Am. Sports, 1940) $0.35.

——*How to Play Infield and Outfield.* (New York: Am. Sports, 1940) $0.40.

Heyliger, V. "Baseball Tips that Aid in Developing the High School and College Player," *Ath. Jr.*, 20 (June 1940) 40–1.

Lehman, H. C. "Geographic Origin of Professional Baseball Players," *Jr. Ed. Res.*, 34 (Oct. 1940) 130–8.

Spalding-Reach Official Baseball Guide. (New York: Am. Sports, 1940) $0.50.

Basketball

"Basketball Rules Illustrated," *Ath. Jr.*, 21 (Sept. 1940) 20–1.

Cavanaugh, J. J. "The Fast-Break Offense," *Ath. Jr.*, 20 (Jan. 1940) 38.

Cooper, J. R. "Team Play Versus Individual Play," *Ath. Jr.*, 20 (Jan. 1940) 38–9.

Dorland, F. "Individual Offense in Basketball," *Ath. Jr.*, 20 (Jan. 1940) 40–2.

Healy, W. A. *High School Basketball.* (Minneapolis: Burgess, 1940) $1.00.

Keene, C. H. "Health Problems in Basketball," *Jr. Health & Phys. Ed.*, 11 (Nov. 1940) 549–50.

Messersmith, L., *et al.* "A Study of Distances Traversed by College Men and Women in Playing the Game of Basketball," RES. QUAR., 11 (Oct. 1940) 30–1.

"(The) Pivot: Its Application," *Ath. Jr.*, 20 (Jan. 1940) 16–7.

Porter, H. V. "Streamlined Basketball Backboard," *Jr. Health & Phys. Ed.*, 11 (Sept. 1940) 423, 447–9.

Willett, A. E. "Modified Basketball Backboard, *Jr. Health & Phys. Ed.*, 11 (Dec. 1940) 609–12, 632–3.

Football

Barbour, R. H. *Football Plays for Boys.* (New York: Appleton-Century, 1940) 127 pp., $1.25.

"Football Rules for 1940," *Ath. Jr.*, 20 (Feb. 1940) 36.

"Football Follies and Fatalities," *Hygeia*, 18 (Jan. 1940) 24–7.

Football through the Years. (New York: Dean Hill, 1940) $2.00.

McLendon, D. C. "Football Practice Drills," *Ath. Jr.*, 21 (Sept. 1940) 22–4.

Nulf, R. W. "Theory and Organization of High School Football," *Ath. Jr.*, 20 (May 1940) 44–6.

Porter, H. V. "Football Rules for 1940: High School Modifications," *Ath. Jr.*, 20 (Feb. 1940) 36.

Spalding's Official Football Guide. (New York: Am. Sports, 1940) $0.50.

Stagg, P. "Selected Rules that Football Players Should Know," *Ath. Jr.*, 21 (Sept. 1940) 26, 52–4.

Williamson, S. "Center Play," *Ath. Jr.*, 21 (Sept. 1940) 11–2.

Football, Six-Man

Cheney, F. L. "Six-Man Football in the College Program," *Ath. Jr.*, 20 (April 1940) 47–50; (May 1940) 9–10, 51.

Duncan, R. O. *Six-Man Football.* (New York: Barnes, 1940) 76 pp., $1.00.

Epler, S. L. "Six-Man Football Rule Changes," *Ath. Jr.*, 20 (May 1940) 11, 49–50.

Larson, A. W. "Six-Man Defense Problems," *Ath. Jr.*, 21 (Sept. 1940) 50–2.

Lenser, K. W. "The Combination Six-Man Offense," *Ath. Jr.*, 21 (Sept. 1940) 44–9.

Official Six-Man Football: Guide and Rule Book. (New York: Barnes, 1940) $0.35.

Golf

Chapman, R. D., and Sands, L. (eds.) *Golf as I Play It: Inside Golf by 28 Champions.* (New York: Carlyle, 1940) 152 pp., $2.00.

Clevett, M. L. "Bringing Golf to All the Students," *Ath. Jr.*, 20 (May 1940) 13–4, 49.

Davies, D. "Class Instruction in Golf," *Jr. Health & Phys. Ed.*, 11 (June 1940) 374.

Shay, C. T. "Horseshoe Golf," *Jr. Health & Phys. Ed.*, 11 (Sept. 1940) 434–5.

Metz, D. *Secret to Par Golf.* (New York: Macmillan, 1940) $2.00.

Morrison, A. J. *Better Golf without Practice.* (New York: Simon-Schuster, 1940) 158 pp., $2.50.

SOCCER

Berry, R. "Base Soccer," *Jr. Health & Phys. Ed.*, 11 (Nov. 1940) 560–1.

Huffman, Z. R. "Soccer-Croquet or Wicket Golf," *Jr. Health & Phys. Ed.*, 11 (April 1940) 238.

Konstantinov, K. L. "Development and Evaluation of a Battery of Soccer Skills as an Index of Ability in Soccer," grad. thesis, Springfield College, 1940, 101 pp.

Spalding's Official College Soccer Football Guide. (New York: Am. Sports, 1940) $0.35.

TENNIS, SQUASH, BADMINTON

Cummings, H. I. *Tennis as a Hobby.* (New York: Harpers, 1940) 88 pp., $1.50.

Dick, T. P. *Badminton.* (Philadelphia: McKay, 1940) 102 pp., $1.00.

Jackson, C. H., *et al. Badminton Tips.* (Detroit: Sport Tips and Teaching Aids, 1940) $2.00.

TRACK AND FIELD

Cromwell, D. "The Pole Vault," *Ath. Jr.*, 21 (Sept. 1940) 54–8.

——— "Training for the Mile," *Ath. Jr.*, 20 (Mar. 1940) 15.

Ganslen, R. V. "Mechanical Analysis of the Pole Vault," grad. thesis, Springfield College, 1940, 331 pp.

Hill, F. "A Study in Pole Vaulting," *Ath. Jr.*, 20 (May 1940) 12–3.

——— "Training for the Discus Throw," *Ath. Jr.*, 20 (April 1940) 10.

Hillman, H. "Training for the Hurdles," *Ath. Jr.*, 20 (Mar. 1940) 18–9, 42–50.

——— "Training for the Sprints," *Ath. Jr.*, 20 (April 1940) 10–2, 43.

Littlefield, C. "Training for the Broad Jump," *Ath. Jr.*, 20 (Mar. 1940) 15, 51.

Lodge, H. G. "Five Principles of Shot-Putting as Exemplified in the Stanford Form," *Ath. Jr.*, 20 (Mar. 1940) 13–4, 42.

Official Intercollegiate Track and Field Guide. (N.C.A.A.) (New York: Am. Sports, 1940) $0.35.

Priebe, R. E. "Teaching Beginners to Pole Vault," *Ath. Jr.*, 20 (Feb. 1940) 5–10, 44–5.

Weisman, S. A. "Are Track Stars Barrel-Chested?" *Jr.-Lancet*, 60 (Dec. 1940) 539–61.

Weldon, L. D. "The Javelin Throw," *Ath. Jr.*, 20 (May 1940) 7–9.

CALISTHENICS, GYMNASTICS, INDOOR ACTIVITIES

Clapp, R. G. (ed.) *Wrestling: Official Guide, College and High School.* (New York: Am. Sports, 1940) 134 pp., $0.35.

Cole, R. K. "Wrestling in the Junior High School," *Ath. Jr.*, 20 (Jan. 1940) 30, 32.

Colucci, F. "Shuffle Hockey," *Ath. Jr.*, 20 (Mar. 1940) 34–8.

Dempsey, J. *Round by Round.* (New York: McGraw-Hill, 1940) 285 pp., $2.50.

Falcaro, J., and Goodman, M. *Bowling.* (New York: Barnes, 1940) 72 pp., $1.00.

Fischer, L. *How to Play Winning Softball.* (New York: Prentice-Hall, 1940) 184 pp., $1.95.

Florio, A. E. "Bowling as a Part of the Curriculum," *Jr. Health & Phys. Ed.*, 11 (April 1940) 232–4, 274–5.

Haislet, E. L. *Boxing.* (New York: Barnes, 1940) 120 pp., $1.00.

"Indoor Polo," *Country Life*, 77 (Feb. 1940) 34.

Kenney, H. E., *et al.* "Evaluation of Boxing as a College Activity," RES. QUAR., 11 (Mar. 1940) 80–93.

Lloyd, N. "Music in the Gymnasium," *Jr. Health & Phys. Ed.*, 11 (Jan. 1940) 15, 62; (Mar. 1940) 142–3, 193–4.

Marino, H., and Sixty, Billy. *Bowling: How to Improve Your Game.* (New York: Prentice-Hall, 1940) 72 pp., $1.00.

Noren, A. T. *Softball.* (New York: Barnes, 1940) 105 pp., $1.00.

Official Boxing Rules. (N.C.A.A.) (New York: Am. Sports, 1940) $0.35.

Price, H. D. "Do You Want to be a Successful Gymnast?" *Ath. Jr.*, 20 (Jan. 1940) 20, 24–8, 34–5; (Mar. 1940) 22–3, 50; (April 1940) 19, 29–30.

Strobel, W. F. "Fundamentals of Foil Fencing," *Ath. Jr.*, 20 (Jan. 1940) 12–5, 33–4.

Vince, J. *Fencing*. (New York: Barnes, 1940) 62 pp., $1.00.

Willigan, W. L., and O'Connor, J. J. *Boxing*. (New York: Longmans, Green, 1940) 387 pp., $1.00.

Wrestling Rules. (N.C.A.A.) (New York: Am. Sports, 1940) $0.35.

CAMPING

Brown, C. L. *Outdoor Cooking*. (New York: Greystone, 1940) 506 pp., $2.50.

Camping and the Older Boy. (New York: Ass'n. Press, 1940) 44 pp., $0.35.

Dimock, H. S., *et al. Some Frontiers of Camping*. (New York: Ass'n. Press, 1940) $0.85.

"Fifth Annual Camp Pow-Wow Program," *Camp. World*, 6 (Jan. 1940) 14–7.

Hurley, R. J. *Camp Fire Tonight*. (Ann Arbor: Peck Press, 1940) 104 pp., $1.00.

"One Hundred Books for a Camp Library," *Camp. World*, 6 (Feb. 1940) 12–3.

Ryden, M. L. "Day Camping Comes to Town," *Camp. Mag.*, 12 (Oct. 1940) 14, 28.

Salomon, J. H. "Changing Conditions in American Camping," *Camp. Mag.*, 12 (April 1940) 3–5, 28–30.

Vetter, R. A., and Salomon, J. H. *Digest of Laws Affecting Organized Camping*. (Washington, D.C.: National Park Service, 1940).

Weir, C. B. "Books at Camp," *Camp. World*, 6 (Feb. 1940) 10–2.

Ativities, Program, Equipment

"Camping and Woodcraft," *Field & Stream*, 44:

(Jan. 1940) Cole, D. M., "Roast and Bake," 66. Murray, S., "Care of Snowshoes," 67.

(Feb. 1940) Emmett, J., "Warm Feet in Cold Weather," 90–1.

(April 1940) Miller, A., "Sleep Warm Outdoors," 118, 120–1.

(May 1940) Emmett, A., "Selecting a Light-Weight Tent," 114–7.

(June 1940) Trueblood, T., and Parker, L., "Preparing for the Pack Trip," 102–4. Dunn, M. B., "Paddle and Portage," 104–7.

(July 1940) Fink, P. M., "What's in Your Fire?" 80–1. Cole, D. M., "Ivy Poisoning," 81.

(Nov. 1940) Vernam, G. R., "Tanning Buckskin," 94–6.

Capowski, J. "A Planned Camp Nature Program," *Camp. World*, 6 (Jan. 1940) 19, 25.

Hunter, H. A. "Pack Trip Technique," *Camp. Mag.*, 12 (May 1940) 14–7, 33–6.

Johnston, M. J. "The Nature Program," *Camp. Mag.*, 12 (Oct. 1940) 3–5, 21, 26–8.

Maar, L. F. "Fire," *Camp. World*, 6 (April 1940) 5–8.

MacQuarrie, G. "Stand the Logs on End" (cabin building), *Field & Stream*, 44 (Jan. 1940) 24–5, 69–70.

Pohndorf, R. H. "Woodcraft and Cookery," *Camp. World*, 6 (April 1940) 10–2.

Proc. Ann. Convention, Am. Camp. Ass'n. (Ann Arbor, Mich. The Association, 1940) 91 pp., $1.00.

Smith, J. V. "Camp Fire Girls: A Health Program," *Education*, 60 (April 1940) 495–7.

Spiller, B. L. "Kooking Kinks," *Field & Stream*, 44 (Jan, 1940) 30–1, 54.

Welch, F. "The Nature Program at Our Camp," *Recreation*, 34 (April 1940) 12–3, 55–6.

Administration, Organization, etc.

Abbott, W. H. "Advertising, Solicitation, and Enrollment," *Camp. Mag.*, 12 (Oct. 1940) 6–7, 26.

Grubb, G. "Guiding the Camp Counselor," *Recreation*, 34 (Aug. 1940) 301–4, 333.

Kristal, F. A. "Water Systems for Camp," *Camp. World*, 6 (Mar. 1940) 8–9.

Liebow, L. J. "It Happened at Camp: A Counselor's Conference Plan," *Camp. World*, 6 (April 1940) 19–21.

Ludwig, W. "Some Attempts at an Educational Use of the Camp's Environment," *Camp. World,* 6 (Feb. 1940) 4-7, 19.

Malcom, J. B., and Wylie, J. A. "Coordinating Summer Camp Programs to Achieve Health Objectives," *Education,* 60 (April 1940) 498-503.

Mansur, A. "Wanted—A Camp Story Teller," *Camp. Mag.,* 12 (Oct. 1940) 24-6.

Marshall, R. C. "Economics in Camping," *Camp. World,* 6 (Mar. 1940) 5-7, 18; (April 1940) 13-7.

"Regulations and Privileges for Counselors," *Camp. World,* 6 (May 1940) 6-12, 34-5.

Ryssel, M. M. "Enlisting Cooperation from the Staff," *Camp. World,* 6 (Jan. 1940) 6-8, 25.

Philosophy, Theory, etc.

Bell, J. "The Camp Administrator Takes a Look at College Training Courses," *Camp. Mag.,* 12 (Feb. 1940) 18, 30.

Boorman, H. J., *et al. Camping in a Democracy.* (New York: Ass'n. Press, 1940) 52 pp., $0.85.

Camping and the Older Boy. (New York: Ass'n. Press, 1940) 44 pp., $0.35.

Doherty, J. K. *Solving Camp Behavior Problems.* (New York: Ass'n. Press, 1940) 62 pp., $0.50.

Durdan, M. J. "What About the Older Campers?" *Camp. Mag.,* 12 (Feb. 1940) 8-9, 25-6.

Edgar, M. S. "By Our Campfires," *Camp. Mag.,* 12 (March 1940) 18-9, 28-9.

Fillmore, A. "I Go Camping," *Am. Jr. Nursing,* 40 (May 1940) 517-22.

Gwynn, P. H. "A Dad Looks at the Summer Camp," *Camp. Mag.,* 12 (June 1940) 3-5, 31-2.

Johnson, C. W. "How One Camp Trains Its Counselors," *Camp. Mag.,* 12 (Feb. 1940) 3-5.

Ledlie, J. A. *Camping and Older Boys.* (New York: Ass'n. Press, 1940) 48 pp., $0.35.

Lindlof, L. "Educational Values of Experience in Camping," *Camp. World,* 6 (March 1940) 10-1, 22-3.

Martin, G. W. *Modern Camping Guide.* (New York: Appleton-Century, 1940) 349 pp., $2.50.

Neasmith, J. I. "I'm Just an Idle Summer Camp," *Camp. World,* 6 (Feb. 1940) 8-10, 19.

Northway, M. L. (ed.) *Charting the Counselor's Course: a Guide for Camp Leaders.* (New York: Longmans, 1940) 128 pp., $1.00.

Ross, H. "Where Do We Stand in Education?" *Camp. Mag.,* 12 (May 1940) 3-5, 28-9.

Schuman, P. "A Survey of Camp Problems," *Camp. Mag.,* 12 (Jan. 1940) 5-7, 32.

Seton, J. M. (ed.) *Ernest Thomson Seton's Trail and Camp-Fire Stories.* (New York: Appleton-Century, 1940) 155 pp., $1.00.

Sharp, L. B. "Give Camping Back to the Campers," *Camp. Mag.* 12 (March 1940) 5-7, 21.

Studer, N. "Rooting the Camp in the Community," *Camp. Mag.,* 12 (Dec. 1940) 4-6, 22.

DANCING, RHYTHMICS, PAGEANTRY

Allen, K. "Indian Dances Today," *Am. Dancer,* 13 (June 1940) 16, 40.

Bassoes, (The). "We, the People, Dance," *Am. Dancer,* 13 (Aug. 1940) 14, 32.

Bechel, M. "Folk Dancing Goes Progressive," *Jr. Health & Phys. Ed.,* 11 (Sept. 1940) 414-5, 454-5.

Bennett, I. "Diet to Dynamics," *Am. Dancer,* 13 (April 1940) 12, 40.

Deane, M. B. "A Working Basis for the High School Dance Program," *Jr. Health & Phys. Ed.,* 11 (Feb. 1940) 81-2, 127.

Dixon, C. M. *The Power of the Dance.* (New York: John Day, 1940) 180 pp., $3.50.

Ebeling, A. "Rhythmical Experiences in the Elementary Grades," *Jr. Health & Phys. Ed.,* 11 (Dec. 1940) 601, 636-7.

Franks, A. H. *Ballroom Dancer's Handbook.* (New York: Pitman, 1940) 134 pp., $2.00.

Harris, A., and Keyes, D. *Teaching Social Dancing.* (New York: Prentice-Hall, 1940) 234 pp., $2.50.

Hellebrandt, B. "Rhythmics in Music and Dance," RES. QUAR., 11 (March 1940) 34-9.

Hinkle, D. T. "Coeducational Social Dance," *Jr. Health & Phys. Ed.*, 11 (May 1940) 298-9, 324-6.

Limon, J. "Dance for Men in the Schools," *Jr. Health & Phys. Ed.*, 11 (March 1940) 148, 189-90.

Loxley, E. "Creative Group Dancing at U.C.L.A.," *Jr. Health & Phys. Ed.*, 11 (Feb. 1940) 80, 117-8.

MacEwan, C. "Dance and the Theater Arts in the Colleges," *Jr. Health & Phys. Ed.*, 11 (April 1940) 212-5, 273.

Martin, J. "A Crisis in the Dance," *Am. Scholar*, 9 (Winter 1939-40) 115-20.

—— "Father of Modern Ballet," *N.Y. Times Mag.* (Dec. 15, 1940) 14-5, 23.

Shaw, L. *Cowboy Dances.* (Caldwell, Idaho: Caxton Printers, 1940) $3.50.

Shawn, T. *Dance We Must.* (Lee, Mass.: Author, 1940) 148 pp., $1.50.

Shelly, M. J. "Facts and Fancies about the Dance in Education," *Jr. Health & Phys. Ed.*, 11 (Jan. 1940) 18-9, 56-7.

Smith, T. J. "The Dance," *Am. Dancer*, 13 (March 1940) 13, 40.

Taylor, D. "Modern Dance for the Average Student," *Jr. Health & Phys. Ed.*, 11 (June 1940) 350-1, 386.

Weiner, M. G. "Trends in Education," *Am. Dancer*, 13 (April 1940) 14-5; (May 1940) 22-3, 38; (June 1940) 18; (July 1940) 18.

Williams, O. W. "Dance Correlates," *Jr. Health & Phys. Ed.*, 11 (Nov. 1940) 544-7, 575-6.

DIAGNOSIS, EXAMINATION

Cole, L. R. "The Acute Exanthemata and their Differential Diagnosis in the College Age Group," *Jr.-Lancet*, 60 (Oct. 1940) 456-7.

Freedman, L. R., and Bloom, E. "A Study of Physical Defects in First- and Eighth-Grade Children in Massachusetts," *The Commonwealth* (State Dept. Public Health), 27 (July-Dec. 1940) 52-60.

Jones, L. M., and Hatfield, J. E. "The Sanction of the Health Examination," RES. QUAR., 11 (March 1940) 19-23.

Lewis, T. *Soldier's Heart and Effort Syndrome.* (2nd. ed.; Chicago: Chicago Med., 1940) 103 pp., $3.00.

Manson-Bahr, P. H. (ed.) *Mason's Tropical Diseases.* (Baltimore: Williams & Wilkins, 1940) 1,083 pp., $11.00.

Methods of Assessing the Physical Fitness of Children. (Washington, D.C.: Child. Bur. Pub. No. 263, 1940) 121 pp., $0.15.

Spock, B. *Changing Task of the School Physician.* (New York: Progressive Educ. Ass'n., 1940) $0.50.

DISEASE

Bishop, L. F., and Bennett, R. V. "Diet and Heart Disease," *Hygeia*, 18 (April 1940) 323-5, 359, 367.

Brailey, M. "Study of Tuberculous Infection and Mortality in the Children of Tuberculous Households," *Am. Jr. Hyg.*, 31 (Jan. 1940) Sec. A, 1-43.

Chadwick, H. D. "Value of Tuberculin Testing Program in Schools," *Boston, Health Educ. News.* (Mass Tuber. League), 5 (Oct.-Dec. 1940) 2-3, 5.

Eisenberg, H. O. "Testing Teachers and Pupils for Tuberculosis," *Am. Sch. Board Jr.*, 101 (July 1940) 50, 79.

Gray, G. W. "The Problem of Influenza," *Harper's*, 180 (Jan. 1940) 165-76.

Hetherington, H. W., and Israel, H. L. "Tuberculosis in Medical Students and Young Physicians," *Am. Jr. Hyg.*, 31 (March 1940) Sec. A, 46-61.

Hutchinson, E. P., and Pope, A. S. "Tuberculosis Among Massachusetts School Children," *Am. Jr. Hyg.*, 31 (March 1940) Sec. A, 62-77.

"I Can't Afford to Be Sick," *Forum & Century*, 103 (March 1940) 109-13.

McKinnon, N. E. "Some Observations on the Control of Communicable Diseases," *Can. Pub. Health Jr.*, 31 (June 1940) 1-5.

Myers, J. A. *Man's Greatest Victory Over Tuberculosis.* (Springfield, Ill.: C. C. Thomas, 1940) 419 pp., $5.00.

Parran, T. "Cancer and Old Age, "*Science*, 51 (Oct. 1940) 293-8.

Peller, S., *et al.* "Cancer in its Relation to Climatic Conditions Acting During Childhood and Adolescence," *Am. Jr. Hyg.*, 31 (July 1940) Sec. A, 39–43.

Robinson, G. W., and Shelton, P. "Treatment of Uncomplicated Acute Alcoholism," *Jr.-Lancet,* 60 (Oct. 1940) 461–4.

Rossi, W. A. "America's Prevalent Foot Disorder" (metatarsalgia), *Am. Jr. Nurs.*, 40 (Feb. 1940) 128–34.

Smith, K. M. *The Virus: Life's Enemy.* (New York: Macmillan, 1940) 176 pp., $2.00.

Stare, F. J., and Bayman, C. A. "Effect of Insulin on Muscle Respiration," *Jr. Biol. Chem.*, 133 (April 1940) 453–66.

Stimson, P. M. *Manual of Common Communicable Diseases.* (Philadelphia: Lea & Febiger, 1940) 465 pp., $4.00.

Twombly, G. H. "Exploring the Chemical Causes of Cancer," *Sci. Mo.*, 50 March 1940) 237–65.

White, P. D. "Deadly Disease Number 1" (heart disease), *Hygeia,* 18 (Feb. 1940) 104–8, 168–9, 191.

Williams, W. C. "Utilization of Available Resources in the Control of Tuberculosis," *Am. Jr. Public Health,* 30 (Sept. 1940) 1073–6.

DRUGS, ALCOHOL, TOBACCO

Adams, R. "Marihuana," *Science,* 92 (Aug. 9, 1940) 115–9.

Almack, J. C. *Straight Thinking on Narcotics: Alcohol, Drugs and Tobacco.* (Mountain View, Calif.: Pacific Press Pub. Ass'n., 1940) 164 pp., $1.25.

Andrews, T. G. "Effect of Benzedrine Sulphate on Syllogistic Reasoning," *Jr. Exper. Psychol.*, 26 (April 1940) 423–31.

Funk, W. *If You Drink.* (New York: W. Funk, Inc., 1940) 171 pp., $2.00.

Gottsegen, J. J. *Tobacco: Study of Its Consumption in United States.* (New York: Pittman, 1940) 279 pp., $2.75.

Pollock, H. M. "Use and Effect of Alcohol in Relation to Alcoholic Mental Disease, before, during and after Prohibition," *Ment. Hyg.*, 24 (June 1940) 112–24.

Strecker, E. A. "Alcoholism," *Hygeia,* 18 (Sept. 1940) 760–2, 828.

Waddell, J. A., and Haag, H. B. *Alcohol in Moderation and Excess.* (Richmond, Va.: Byrd, 1940) 221 pp., $1.50.

Wilson, G. B. *Alcohol and the Nation* (Great Britain). (Philadelphia: Saunders, 1940) 456 pp., $7.50.

EUGENICS, EVOLUTION, GENETICS, HEREDITY

Ashley-Montagu, M. F. "Sociobiology of Man," *Sci. Mo.*, 50 (June 1940) 483–90.

Bloor, W. R. "Inheritance Effect of Exercise on the Phospholipid and Cholesterol Content of Muscle," *Jr. Biol. Chem.*, 132 (Jan. 1940) 77–82.

Burlingame, L. L. *Heredity and Social Problems.* (New York: McGraw, 1940) 369 pp., $3.50.

Dunlap, K. "Antidotes for Superstitions Concerning Human Heredity," *Science,* 51 (Sept. 1940) 221–5.

Horwood, M. P. "Biology and Human Affairs," *Sci. Mo.*, 51 (July 1940) 49–58.

Krogman, M. M. "Is There a Physical Basis for Race Superiority?" *Sci. Mo.*, 51 (Nov. 1940) 428–34.

Mather, K. F. "The Future of Man as an Inhabitant of the Earth," *Sci. Mo.*, 50 (March 1940) 193–203.

Osborn, F. *Preface to Eugenics.* (New York: Harpers, 1940) 312 pp., $2.75.

Seashore, C. E. "Musical Inheritance," *Sci. Mo.*, 50 (April 1940) 361–6.

Simons, I. *Unto the Fourth Generation.* (New York: Dutton, 1940) 243 pp., $2.50.

FIRST AID, ACCIDENTS, EMERGENCIES, NURSING

"Anti-Poison Ivy Vanishing Cream," *Science,* 92 (July 12, 1940) Suppl., 6–7.

Brown, E. L. *Nursing as a Profession.* (New York: Russell Sage Foundation, 1940) 157 pp., $0.75.

Chavannes, E. "Do You Know Poison Ivy?" *Hygeia,* 18 (May 1940) 433–4, 461–2.

Craig, LeR. N. "Opportunities for Men Nurses," *Am. Jr. Nurs.,* 40 (June 1940) 666–7.

Farnworth, M. *Roller and Triangular Bandages.* (Toronto: Ryerson Press, 1940) 152 pp., $1.25.

Geiger, J. C. *Manual of Medical and Surgical Emergencies.* (San Francisco: Stacey, 1940) 199 pp., $2.50.

Gilbert, R. *The Public Health Nurse and Her Patient.* (New York: Commonwealth Fund, 1940) 380 pp., $2.25.

Heisler, A. "Supervision of Public Health Nurses," *Am. Jr. Public Health,* 30 (July 1940) 749–54.

Jensen, A. *Massage and Exercises Combined.* (Milwaukee: Caspar, 1940) 93 pp., $3.00.

Kennedy, R. H. "Emergency Care of Broken Bones," *Hygeia,* 18 (July 1940) 599–601.

McAvoy, C. A. "First Aid for Burns," *Sci. Am.,* 163 (Sept. 1940) 126–7.

McClure, R. D., and Lam, C. R. "Treatment of Burns," *Am. Jr. Nurs.,* 40 (May 1940) 498–501.

Military Sanitation and First Aid. (Washington, D. C. Sup't. Docs., 1940) 192 pp., $0.25.

Oakes, L. (Comp.) *Illustrations of Bandaging and First Aid.* (New York: Wood, 1940) 248 pp., $2.00.

"Poison Ivy Prevention," *Sci. Am.,* 163 (Sept. 1940) 127.

Schwartz, L., *et al.* "Protective Ointment for Prevention of Poison Ivy Dermatitis," *Pub. Health. Rep.,* 55 (July 26, 1940) 1327–33.

Wetzel, M., and Tremper, B. "A Community Nursing Service," *Am. Jr. Nurs.,* 40 (Jan. 1940) 40–6.

FOOD, DIET, NUTRITION

Abbott, J. S. "Food Value and Economics of Skim Milk," *Am. Jr. Pub. Health,* 30 (March 1940) 237–9.

Bourne, G. *Nutrition and War.* (New York: Macmillan, 1940) 126 pp., $1.10.

Breed, R. S. "The Whence and Whither of Milk Sanitation," *Can. Pub. Health Jr.,* 31 (Sept. 1940) 414–23.

"Cheese: Nutritive Value," *Hygeia,* 18 (March 1940) 243–4.

Cook Book, U. S. Navy. (Washington, D. C.: 1940) 164 pp., $0.70.

Cummings, R. O. *The American and His Food: History of Food Habits in U. S.* (Chicago: Univ. Chicago Press, 1940) 267 pp., $2.50.

Edwards, J. F. "Foods and Nutrition: Oysters," *Hygeia,* 18 (Jan. 1940) 62–5.

Eichelberger, M. "Importance of Economical Milk in Human Nutrition," *Am. Jr. Public Health,* 30 (Feb. 1940) 169–75.

Fyler, F. M. "Quick-Frozen Foods," *Hygeia,* 18 (Feb. 1940) 52–5.

——— "Cold Facts About Ice Cream," *Hygeia,* 18 (June 1940) 540–2.

Kaczmarek, R. M. "Effect of Gelatin on the Work Output of Male Athletes and Non-Athletes and Girl Subjects," RES. QUAR., 11 (Dec. 1940) 109–19.

Knowlton, G. C. "Effect of Gelatin Feeding upon the Strength and Fatigability of Rats' Skeletal Muscle," *Am. Jr. Hyg.,* 131 (Dec. 1940) 426–7.

Levin, S. I., and Boyden, E. A. *The Kosher Code of the Orthodox Jew.* (Minneapolis: Univ. Minn. Press, 1940) 243 pp., $4.50.

Mottram, V. H., and Graham, G. *Hutchison's Food and Dietetics.* (Baltimore: Williams & Wilkins, 1940) 648 pp., $6.75.

Plimmer, V. G. *Food Values at a Glance.* (New York: Longmans, 1940) 190 pp., $2.00.

Rose, M. D. S. *Feeding the Family.* (4th. ed.; New York: Macmillan, 1940) 421 pp., $3.75 (college edition).

Schmidt, W. "Newer Medical Methods of Appraisal of Nutritional Status," *Am. Jr. Public Health,* 30 (Feb. 1940) 165–8.

Sherman, H. C., and Lanford, C. S. *Essentials of Nutrition.* (New York: Macmillan, 1940) 418 pp., $3.50.

Vaughan, W. T. "Why We Eat What We Eat," *Sci. Mo.,* 50 (Feb. 1940) 148–55.

HEALTH EDUCATION, TRAINING

Armstrong, D. B., and Shepard, W. P. "An 'American' Health Program," *Am. Jr. Pub. Health,* 30 (Sept. 1940) 1023–6.

Bauer, W. W. "Healthier Health Meetings," *Am. Jr. Pub. Health,* 30 (May 1940) 523–6.

Brown, W. H. "School Health Education," *Am. Jr. Pub. Health,* 30 (Jan. 1940) 35–8.

Currey, D. V., and Nicolle, A. G. "Development of a Health Program in the Secondary School," *Can. Pub. Health Jr.*, 31 (April 1940) 75–83.

Dunn, H. L. "Human Relations as a Public Health Problem," *Am. Jr. Pub. Health,* 30 (Nov. 1940) 1318–22.

Frank, J. O., and Discher, C. A. "Study of Health Materials in High-School Chemistry Texts," *Jr. Chem. Educ.* 7 (May 1940) 236–40.

Gebhard, B. "Health Exhibits," *Am. Jr. Pub. Health,* 30 (June 1940) 657–60.

Greenman, R. A. "Incentives and Methods in Health Education-Adult Level: The Medical Society View," *Am. Jr. Pub. Health,* 30 (Oct. 1940) 1211–7.

Harris, R. F. "Coordination of Educational Programs of All Health Workers," *Am. Jr. Pub. Health,* 30 (Aug. 1940) 938–43.

Health Education. (Washington, D. C.: Natn'l. Educ. Ass'n., 1940) 368 pp., $1.50.

Higby, W. F. "Health Education of the Public," *Am. Jr. Pub. Health,* 30 (March 1940) 278–86.

Hiscock, I. V. "Community Health Education," *Am. Jr. Pub. Health,* 30 (May 1940) 516–22.

Morgan, L. S., and Horning, B. G. "Community Health Education Program: The Hartford Plan," *Am. Jr. Pub. Health,* 30 (Nov. 1940) 1223–30.

Organization and Administration of School Health Work. (Washington, D. C.: Office of Educ., 1940) 67 pp., $0.15.

Patty, W. W. *Teaching Health Education and Safety in Elementary Grades.* (New York: Prentice-Hall, 1940) 371 pp., $2.50.

Ries, J. "The Health Educator on the Radio," *Am. Jr. Pub. Health,* 30 (June 1940) 641–4.

Riggin, I. C. "How Can the Health Officer Make Greater Use of the Health Education Specialist?" *Am. Jr. Pub. Health,* 30 (Aug. 1940) 921–7.

Strachan, L. "Appraising School Health Education," *Jr. Health & Phys. Ed.,* 11 (Jan. 1940) 11, 58–9.

Studebaker, J. W. "Administration of Health Education," *Jr. Health & Phys. Ed.,* 11 (June 1940) 339–41, 388–9.

Turner, C. E. *Principles of Health Education.* (2nd. ed.; Boston: Heath, 1940) 351 pp., $2.00.

——— and Stimpson, M. R. "Evaluating the Health Education Program of a Health Department," *Am. Jr. Pub. Health,* 30 (July 1940) 771-4.

Wolman, A. "The National Health Program: Present Status," *Am. Jr. Pub. Health,* 30 (Jan. 1940) 1–8.

HEALTH INSURANCE

Brown, J. D. "Economic Aspects of Social Security against Life Hazards," *Am. Labor Legis. Rev.,* 30 (March 1940) 33–9.

Choles, I. A. "Sickness Insurance," *Hygeia,* 18 (July 1940) 628–9.

Falk, I. S. "Permanent Disability Insurance," *Am. Labor Legis. Rev.,* 30 (June 1940) 68–71.

Harding, T. S. "Farmers and Miners in Group-Health Plans," *Am. Scholar,* 19 (Summer 1940) 305–15.

"Health Insurance via Unemployment Compensation," *Am. Labor Legis. Rev.,* 30 (June 1940) 54.

Murray, J. E. "National Health Bill," *Am. Labor Legis. Rev.,* 30 (March 1940) 9–16.

Wagner, R. F. "Progress toward Health Insurance," *Am. Labor Legis. Rev.,* 30 (March 1940) 17–9.

HISTORY

Cassidy, R. "New Directions in Physical Education," *Jr. Health & Phys. Ed.,* 11 (Sept. 1940) 408–9, 444–6.

"(The) Defense-Training Program: Progress Report," *Sch. Life,* 26 (Dec. 1940) 74-7.

Farley, B. "Physical Educators Meet in Chicago," *Sch. & Soc'y.,* 51 (May 18, 1940) 647-9.

Geiger, J. C. *1940 Yearbook of Health.* (Chicago: Yearbook Pubs., 1940) 560 pp., $3.00.

Hanson, E. P. "Stefanson: Twenty Years After," *Harpers,* 180 (March 1940) 375-86.

Hines, N. E. "Decade of Progress in Birth Control," *The Annals,* 212 (Nov. 1940) 88-96.

Hutchins, H. C. "Trends in Public Recreation," *Recreation,* 33 (Jan. 1940) 573-5, 589-90.

Knox, W. S. "Sport Glimpses in Hawaii," *Jr. Health & Phys. Ed.,* 11 (Feb. 1940) 67-70, 125.

McCormick, M. L. "Orientation in Physical Education," *Jr. Health & Phys. Ed.,* 11 (March 1940) 144-5, 197-9.

McCristal, K. J. "The Latest in Sports Buildings," *Jr. Health & Phys. Ed.,* 11 (Oct. 1940) 464-6, 511-2.

Nason, J., *et al. Famous American Athletes of Today.* (Boston: Page, 1940) 448 pp., $2.50.

"Needed Curriculum Revision," *Jr. Health & Phys. Ed.,* 11 (Nov. 1940):
  Rugen, M. E., "Health Education," 532-5, 573-4.
  Boulton, I., "Physical Education," 532-5, 580-3.
  Hutchins, H. C., "Recreation," 532-5, 578-80.

Proceedings, College Physical Education Association for 1939. (Columbus, Ohio, G. W. Howard, Sec'y., 1940) $1.50.

Raycroft, J. E. "History and Development of Student Health Programs in Colleges and Universities," *Proc. Am. Student Health Ass'n.,* 1939, 37-43.

Schrader, C. L. "From Whence Our Sports?" *Jr. Health & Phys. Ed.,* 11 (Dec. 1940) 590-1.

Shoemaker, R. F. "Status of Intramural Athletics in Boys' Preparatory Schools of New England," grad. thesis, Springfield College, 1940.

"Tables of Playground and Community Recreation Statistics for 1939," *Recreation,* 34 (June 1940) 145-78.

Temkin, O. "Health Education through the Ages, "*Am. Jr. Pub. Health,* 30 (Sept. 1940) 1091-5.

White, E. W. "Trends in Public Recreation," *Recreation,* 33 (Feb. 1940) 609-10, 638-9.

Winslow, C.-E. A. "A Half Century of the Massachusetts Public Health Association," *Am. Jr. Pub. Health,* 30 (April 1940) 325-35.

HYGIENE

Child and Mother

Bossard, J. H. L. *Marriage and the Child.* (Philadelphia: Univ. Penn Press, 1940) 178 pp., $2.00.

Brown, A. "Child Care in War Time," *Can. Pub. Health Jr.,* 31 (March 1940) 106-10.

Brown, C. A. "The Educator Views the Health Needs of the Elementary School," *Can. Pub. Health Jr.,* 31 (July 1940) 331-5.

Child Health Conference, Suggestions for Organization and Procedure. (Washington, D. C.: Child. Bur., 1940) 42 pp., $0.10.

Faegre, M. L., and Anderson, J. E. *Child Care and Training.* (5th. ed., rev.; Minneapolis: Univ. Minn., 1940) 320 pp., $2.50.

Hood, R. V. "Services for Crippled Children under the Social Security Act," *Am. Jr. Pub. Health,* 30 (Aug. 1940) 935-7.

Hunt, L. W. *The Child in the Home.* (New York: Prentice-Hall, 1940) 259 pp., $2.50.

Roberts, L. J. "Status of Nutrition Work with Children," *The Annals,* 212 (Nov. 1940) 111-20.

Sadler, W. S. and L. K. *Growing Out of Babyhood* (preschool problems). (New York: Funk, 1940) 250 pp., $2.50.

Stevenson, G. S. "Mental Hygiene of Childhood," *The Annals,* 212 (Nov. 1940) 130-7.

Thompson, W. S. "Population Changes and Child Welfare," *The Annals,* 212 (Nov. 1940) 18-23.

Community and Public

Butler, A. M. "Quality of Medical Care under a National Health Act," *Am. Jr. Pub. Health,* 30 (Feb. 1940) 145–8.

Carmody, J. M. "The Federal Works Agency and Public Health," *Am. Jr. Pub. Health,* 30 (Aug. 1940) 887–94.

Coffey, E. R. "Training for Public Health: A Review and a Forecast," *Am. Jr. Pub. Health,* 30 (July 1940) 743–8.

Defries, R. D. (ed.) *Development of Public Health in Canada.* (Toronto, Can.: Public Health Ass'n., 1940) 184 pp., $1.25.

Emerson, H. "The Physician's Part in Organized Medical Care," *Am. Jr. Pub. Health,* 30 (Jan. 1940) 9–16.

Graf, W. W. "Water Treatment," *Am. City,* 55 (Sept. 1940) 54–6.

Herms, W. B., and Gray, H. F. *Mosquito Control.* (New York: Commonwealth Fund, 1940) 317 pp., $3.50.

Hope, E. W., and Stallybrass, C. O. *Textbook of Public Health.* (10th. ed.; Baltimore: Williams & Wilkins, 1940) 510 pp., $6.50.

"Housing Officials Turn Attention toward 'Defense Housing,'" *Am. City,* 55 (July 1940) 47.

Miller, K. E. "Public Health Aspects of Unrestrained Advertising," *Am. Jr. Pub. Health,* 30 (Aug. 1940) 880–6.

Mountain, J. W. "Administration of Public Medical Service by Health Departments," *Am. Jr. Pub. Health,* 30 (Feb. 1940) 38–44.

Porter, C. "Housing: Your Problem and Ours," *Am. Jr. Pub. Health,* 30 (Aug. 1940) 909–14.

"Sanitary Engineering in a City Health Department," *Am. City,* 55 (Aug. 1940) 61–2.

Smillie, W. G. *Public Health Administration in the United States.* (New York: Macmillan, 1940) 553 pp., $3.75.

Soule, E. S., and MacKenzie, C. *Community Hygiene.* (New York: Macmillan, 1940) 218 pp., $1.75.

Van Etten, N. B. "Better Health for America," *Science,* 91 (June 21, 1940) 581–8.

Williams, R. C. "Development of Medical Care Plans for Low Income Families: Three Years Experience," *Am. Jr. Pub. Health,* 30 (July 1940) 725–35.

Ziegler, M. V., and Brockett, G. S. "Prevailing Employment Policies in Health Departments," *Am. Jr. Pub. Health,* 30 (July 1940) 779–86.

Domestic and Personal

Aaron, H. *Good Health and Bad Medicine.* (New York: McBride, 1940) 328 pp., $3.00.

Barton, F. B. *It's Fun to Keep Fit.* (New York: Harpers, 1940) 160 pp., $2.00.

Bauer, W. W. *Americans Live Longer.* (Indianapolis: Bobbs, 1940) 219 pp., $2.00.

Brotman, R. H. *Let's Look at Your Teeth.* (New York: House of Field, 1940) 277 pp., $2.50.

Cowdry, E. V. "We Grow Old," *Sci. Mo.,* 50 (Jan. 1940) 51–9.

De Kruif, P. H. *Fight for Life.* (New York: Harcourt, 1940) 342 pp., $1.50.

——— *Health Is Wealth.* (New York: Harcourt, 1940) 246 pp., $2.00.

Derthick, L. G., *et al. Be Safe and Live.* (New York: Johnson, 1940) 336 pp., $1.00.

Geiger, J. C. *Household Hygiene.* (San Francisco Dept. Health, 1940) 96 pp.

Haar, F. B. "Analysis of Interests of High School Students in Personal Hygiene in the Secondary School of Pittsburgh," grad. thesis, Univ. Pittsburgh, 1940.

Krueger, W. W. *Fundamentals of Personal Hygiene,* (3rd. ed.; Philadelphia: Saunders, 1940) 304 pp., $1.75.

Morrey, L. W. *Teeth, Health, and Appearance.* (Chicago: Am. Dent. Ass'n., 1940) 48 pp., $1.50.

Rice, T. B. *Living.* (Chicago: Scott, Foresman, 1940) 464 pp., $2.25.

Rony, H. R. *Obesity and Leanness.* (Philadelphia: Lea, 1940) 300 pp., $3.75.

Industrial

Bulmer, F. M. R. "Industrial Medical Service in Peace and War," *Can. Pub. Health Jr.,* 31 (March 1940) 111–9.

Cunningham, J. G. "Industrial Health and National Defense," *Can. Pub. Health Jr.*, 31 (Nov. 1940) 556–9.

Dallavalle, J. M., and Jones, R. R. "Basic Principles of Industrial Sanitation," *Am. Jr. Pub. Health*, 30 (April 1940) 369–84.

Eilman, H. J. *Medicolegal and Industrial Toxicology, Criminal Investigation, Occupational Diseases.* (Philadelphia: Blakiston, 1940) 324 pp., $3.00.

Everts, G. "Industrial Hygiene for the Smaller Plant," *Am. Jr. Pub. Health*, 30 (Jan. 1940) 17–21.

Ficklin, J. B. *Manual of Industrial Health Hazards.* (West Hartford, Conn.: Service to Industry, 1940) 167 pp., $4.00.

Graves, L. M., *et al.* "Integrating Industrial Hygiene with Local Health Service," *Am. Jr. Pub. Health*, 30 (May 1940) 493–8.

Humble, M. K. "Safeguarding Shop Students," *Education*, 60 (May 1940) 574–8.

Johnson, W. S. "An Administrative Approach to Industrial Hygiene," *Am. Jr. Pub. Health*, 30 (July 1940) 806–10.

Lanza, A. J., and Goldberg, J. A. (eds.) *Industrial Hygiene.* (New York: Oxford Univ. Press, 1940) 743 pp., $8.50.

McMahon, J. F. "Employee Health Pays Dividends," *Sci. Am.*, 162 (May 1940) 278–81.

Prescott, S. C., *et al. Industrial Microbiology.* (New York: McGraw-Hill, 1940) 541 pp., $5.00.

Riddell, A. R. "Problems Which Arise in the Handling of Illness among Wage Earners," *Can. Pub. Health Jr.*, 31 (May 1940) 223–7.

Selby, C. D. "Approaching the Health Problems of Adult Life through Industry," *Am. Jr. Pub. Health*, 30 (April 1940) 336–40.

Vernon, H. M. *Health and Efficiency of Munition Workers.* (New York: Oxford Univ. Press, 1940) 138 pp., $2.50.

MENTAL

Anderson, C. M. *Emotional Hygiene: the Art of Understanding.* (2nd. ed.; Philadelphia: Lippincott, 1940) $2.00.

Annette, S. "An Integrated Program of Mental Hygiene," *Jr. Health & Phys. Ed.*, 11 (April 1940) 219, 268–70.

Astor, F. "Mental Hygiene in the Classroom," *Hygeia*, 18 (May 1940) 417–9, 458, 465.

Averill, L. A. *Mental Hygiene for the Classroom Teacher.* (New York: Pitman, 1940) $2.00.

Barker, L. F. *Psychotherapy.* (New York: Appleton-Century, 1940) 218 pp., $2.00.

Bernard, H. W. "College Mental Hygiene: a Decade of Growth," *Ment. Hyg.*, 24 (July 1940) 413–8.

Blanchard, V. S. "Mental Hygiene on the Job," *Jr. Health & Phys. Ed.*, 11 (Feb. 1940) 118–20.

Brown, G. A. "Suggestions on the Study of Mental Energy," *Jr. Ed. Res.*, 33 (March 1940) 531–3.

——— "The Energies which Develop the Mind," *Jr. Ed. Res.*, 33 (April 1940) 613–7.

Carlquist, M. "With the Least Possible Tension," *Jr. Health & Phys. Ed.*, 11 (Jan. 1940) 53–4.

Carrier, B. "The Role of Mental Hygiene in the College, "*Ment. Hyg.*, 24 (Oct. 1940) 595–9.

Fenton, N. "Mental Hygiene in Theory and Practice," *Jr. Health & Phys. Ed.*, 11 (Jan. 1940) 3–5, 60–2.

Griffin, J. M., *et al. Mental Hygiene: A Manual for Teachers.* (New York: Am. Book., 1940) 291 pp., $1.75.

Gundry, G. H. "Mental Hygiene in School Health Work," *Can. Pub. Health Jr.*, 31 (Dec. 1940) 481–6.

Manwell, E. M. "Three Basic Needs," *Am. Jr. Nurs.*, 40 (April 1940) 403–8.

Mortis, S. B. "Child Care" (mental health), *Hygeia*, 18 (Mar. 1940) 274–6.

Phelan, E. E. "Good Sports for Mental Patients," *Jr. Health & Phys. Ed.*, 11 (Dec. 1940) 608, 640–2.

Pitkin, W. B. *Escape from Fear.* (New York: Doubleday, 1940) 264 pp., $2.00.

Pulliam, R. "Promoting Mental Health and Social Adjustment of Pupils," *Elem. Sch. Jr.*, 41 (Sept. 1940) 28–37.

Watson, M. "Mental Hygiene and the Student," *Ment. Hyg.*, 24 (Oct. 1940) 614–20.

Worth, C. L. "Some Implications of Mental Hygiene in Supervision," *Am. Sch. Board Jr.*, 100 (Feb. 1940) 38.

SCHOOL AND COLLEGE

Baker, A. B., and Cowan, D. W. "Cold Prevention Studies, *"Jr.-Lancet,"* 60 (Oct. 1940) 453–6.

Bennett, H. E. "Fifty Years of School Seating," *Am. Sch. Board. Jr.*, 100 (March 1940) 41–3, 125.

Boynton, R. E. "Health of College Students and National Defense," *Proc. Am. Stud. Health Assn., 1939*, 26–7.

Byrd, O. E. "Study and Measurement of Health Attitudes," grad. thesis, Stanford Univ., 1940.

Freedman, L. R., and Bloom, E. "Twenty-Four Hour Massachusetts High School Study: Food Section," *The Commonwealth* (Bul. State Dept. Pub. Health), 27 (July-Dec. 1940) 72–85.

Grout, R. E. "Appraising a School Health Education Program," *Am. Jr. Pub. Health*, 30 (July 1940) 797–805.

Kler, J. H. "Eye Health among College Students," *Jr.-Lancet*, 60 (Nov. 1940) 487–90.

Nelson, H. W. "School Heating and Ventilating during the Past Fifty Years," *Am. Sch. Board Jr.*, 100 (March 1940) 37–8.

Proc. American Student Health Association, 1939. (Lawrence, Kan., R. I. Canuteson, Sec'y, 1940) $1.75.

Rogers, J. F. "Making the Most of Medical Inspection," *Sch. Life*, 25 (March 1940) 167, 186.

Scoville, D. H. "Appendicitis: a Hazard of Youth," *Proc. Am. Stud. Health Assn., 1939*, 54–9.

Shrader, E. L. "The Student Health Service Physician," *Jr.-Lancet*, 60 (Jan. 1940) 5–7.

Smiley, D. F., and Gould, A. G. *College Textbook of Hygiene.* (3rd. ed.; New York: Macmillan, 1940) 539 pp., $2.50.

Spock, B. "The Modern School Physician: His Relation to Other Employees, Teachers, Children, Nurses," *Prog. Ed.*, 17 (Feb. 1940) 137–40.

Stetson, D. "Janitors Become Engineers," *Am. Sch. Board Jr.*, 101 (Oct. 1940) 42–3.

"Suggested School Health Policies: Committee Report," *Jr. Health & Phys. Ed.*, 11 (May 1940) 283–6, 333–5; (June 1940) 358–61, 389–91. *Hygeia*, 18 (Sept. 1940) 840, 842–6; (Oct. 1940) 936, 938–41.

Sundwall, J. "The Medical School and the Student Health Service," *Jr. Assn. Med. Colleges*, March, 1940.

"Staff Education through a Study of Malnutrition in School Children," *Am. Jr. Pub. Health*, 30 (May 1940) 542–7.

York, W. H. "A Student Health Auxiliary," *Proc. Am. Stud. Health Assn., 1939*, 60–1.

SOCIAL AND SEX

Forsythe, W. E. "The Place of Sex Education in School," *Hygeia*, 18 (Jan. 1940) 18–20.

Groves, E. R. *The Family in Its Social Functions.* (Philadelphia: Lippincott, 1940) 631 pp., $3.50.

Himes, N.E. *Your Marriage: a Guide to Happiness.* (New York: Farrar & Rinehart, 1940) 434 pp., $3.75.

Jensen, R. A. "The Psychology of Sex," *Hygeia*, 18 (Feb. 1940) 124–8, 155.

Jung, M. *Modern Marriage.* (New York: Crofts, 1940) 420 pp., $3.75.

Kirkendall, L. A. *Sex Adjustments of Young Men.* (New York: Harper, 1940) 215 pp., $2.00.

Parran, T. "Health and Medical Preparedness," *Am. Jr. Pub. Health*, 30 (Nov. 1940) 1348–50.

Popenoe, P. B. *Modern Marriage: a Handbook for Men.* (New York: Macmillan, 1940) 299 pp., $2.50.

Robson, J. M. *Recent Advances in Sex and Reproductive Physiology.* (Philadelphia: Blakiston, 1940) 329 pp., $5.00.

ORGANIZATION, ADMINISTRATION, SUPERVISION

Bresslin, A. E. "Meeting Association and Club Members' Health Needs," *Education*, 60 (April 1940) 488–90.

Carpenter, A. "An Indoor Interclass Pentathlon," *Jr. Health & Phys. Ed.*, 11 (Feb. 1940) 104–5.

Constitution, By-Laws, Athletic Rules, Intercollegiate Association of Amateur

Athletes of America. (New York: Am. Sports, 1940) 2 vols, each $0.35.
Cromwell, O. K. "Application of Basic Business Principles to Budget and Finance in Intercollegiate Athletics," grad. thesis, Columbia Univ., 1940.
Daugherty, G. "Intramural Clubs," *Jr. Health & Phys. Ed.*, 11 (Dec. 1940) 613, 139–40.
Giauque, C. D. "Student Recreation on Our College Campuses," *Jr. Health & Phys. Ed.*, 11 (March 1940) 131–3, 194–5.
Gloss, G. M. "Corecreation in Physical Education Programs," *Jr. Health & Phys. Ed.*, 11 (Jan. 1940) 31, 50–60.
Hayes, R. F. "Administrative Procedures in Introducing Tests in Large Cities," *Education,* 60 (April 1940) 469–72.
Hines, T. H. "Redirecting Physical Education: Administrative Policies and Actions," *Education,* 50 (April 1940) 462–9.
Hinman, S. "Organization and Administration of Health and Physical Training in Large Cities," RES. QUAR., 11 (Dec. 1940) 97–107.
Larson, M. "Student Paper Cooperation in Promoting an Intramural Program," *Ath. Jr.*, 20 (March 1940) 40–2.
Martin, C. F. "Administrative Problems in Meeting Individual Needs," *Jr. Health & Phys. Ed.*, 11 (April 1940) 230–1, 277.
Meadows, A. R. "Safety and Economy in School Bus Transportation," grad. thesis, Teachers College, New York, 1940, 288 pp.
Newsom, H. A. "Student Assistance in a University Physical Education Program," *Jr. Health & Phys. Ed.*, 11 (Oct. 1940) 474–5, 507–8.
Noble, M. C. S. *Pupil Transportation in the United States.* (Scranton, Pa.: International Textbook Co., 1940) 571 pp., $3.50.
Proceedings, 34th Annual Convention, National Collegiate Athletic Association, 1939. (Middletown, Conn., Wesleyan Univ., F. W. Nicholson, Sec'y.)
"Should the School Health Service be Administered by Departments of Education or Departments of Health?" *Sch. Life,* 25:
Outland, C. L., "Affirmative," (April 1940) 208, 210.
Buckler, H. W., "Negative," (April 1940) 208–10.
Speir, H. B. "Coordinating Health Agencies," *Jr. Health & Phys. Ed.*, 11 (Dec. 1940) 600, 643.
Streit, W. K. "Some Thoughts on Supervision," *Jr. Health & Phys. Ed.*, 11 (May 1940) 292–4, 326–8.
Studebaker, J. W. "Relation of Health Education to Public Administration," *Sch. Life,* 25 (July 1940) 311–2.

PHILOSOPHY, PRINCIPLES, PROBLEMS

Chapple, E. D. "Measuring Human Relations: An Introduction to the Study of the Interaction of Individuals," *Genet. Psych. Monographs,* 22 (Feb. 1941) 3–147.
Cottrell, D. P. "A Philosophy of Education," *Am. Jr. Nurs.*, 40 (Aug. 1940) 914–22.
Dean, E. S. "What is Your Sport Philosophy?" *Ath. Jr.*, 20 (Mar. 1941) 24.
Dunn, D. D., and Leonard, C. S. "Realizable Ideals in Secondary School Physical Education," *Education,* 60 (April 1940) 478–82.
Everts, E. W. "A Vital Need in Health, Physical Education, and Recreation," *Education,* 60 (April 1940) 451–8.
Halsey, E. "Regional Problems in Recreation," *Jr. Health & Phys. Ed.*, 11 (Nov. 1940) 74–5.
Harmon, J. M. "Educational Principles in Administering Intercollegiate Athletics," *Education,* 60 (April 1940) 513–6.
Johnson, F. E. "Character Education," *Am. Jr. Nurs.*, 40 (July 1940) 761–6.
McCloy, C. H. *Philosophical Basis for Physical Education.* (New York: Crofts, 1940) 311 pp., $2.50.
Morey, R. "Basic Needs of Man in Society," *Jr. Ed. Res.*, 34 (Sept. 1940) 1–14.
Pendergast, H. A. *An Appreciation of Physical Education.* (Baton Rouge, La.: Author, 1940) 168 pp.
Richards, S. S., and Wolff, E. "Organization and Function of Play Activities in the Set Up of a Pediatric Depart-

ment," *Mental Hyg.* 24 (April 1940) 229–37.

Stieglitz, E. J. "Wise Investment of Leisure," *Sci. Mo.*, 51 (Aug. 1940) 147–57.

Stoddard, A. J. "How Can Education Improve the Nation's Health?" *Jr. Health & Phys. Ed.*, 11 (Oct. 1940) 459–60, 518–9.

Strang, R. "Contribution of the Physical and Health Education Teacher to the Guidance Program," *Jr.-Lancet*, 60 (Dec. 1940) 542–3.

PHYSIOLOGY, ANATOMY

Annual Review of Physiology, 1939-40. (Stanford University, Cal.: Stanford Univ., 1940) 2 vol., each $5.00.

Baitsell, G. A. *Human Biology*, (New York: McGraw-Hill, 1940) 621 pp., $3.75.

Bauer, W., *et al.* "Physiology of Articular Structures," *Physiol. Rev.*, 20 (April 1940) 272–312.

Bazett, H. C., *et al.* "Climatic Effects on the Volume and Composition of Blood in Man," *Am. Jr. Physiol.*, 129 (April 1940) 69–83.

Berg, M., *et al.* "Variability of Blood pH and Its Association with Meteorological Factors," *Am. Jr. Physiol.*, 130 (July 1940) 9–21.

Bradley, N. "Muscles," *Education*, 60 (April 1940) 525–7.

Burton, A. C., *et al.* "Slow Adaptation in the Heat Exchanges of Man to Changed Climatic Conditions," *Am. Jr. Physiol.*, 129 (April 1940) 94–101.

Dill, D. B., and Zamcheck, N. "Respiratory Adjustments to Oxygen Lack in the Presence of Carbon Dioxide," *Am. Jr. Physiol.*, 129 (April 1940) 47–52.

Estabrooks, G. H. "Spare Parts" (human body functions), *Sci. Am.*, 162 (Feb. 1940) 92–4.

Forbes, W. H., Dill, D. B., and Hall, F. G. "Effects of Climate upon Volumes of Blood and of Tissue Fluid in Man," *Am. Jr. Physiol.*, 130 (Oct. 1940) 739–46.

Gessel, R., Lapides, J., and Levin, M. "Interaction of Central and Peripheral Chemical Control of Breathing," *Am. Jr. Physiol.*, 130 (July 1940) 155–70.

Hickman, C. P. *Functional Human Anatomy.* (New York: Prentice-Hall, 1940) 501 pp., $3.75.

Knowlton, G. C., and Hines, H. M. "Effects of Growth and Atrophy upon Strength of Skeletal Muscle," *Am. Jr. Physiol.*, 128 (Feb. 1940) 521–5.

Myers, V. C., and Muntwyler, E. "Chemical Changes in the Blood and Their Clinical Significance," *Physiol. Rev.*, 20 (Jan. 1940) 1–36.

Parker, G. H. "A Modern Conception of the Action of the Nervous System," *Science*, 92 (Oct. 1940) 319–23.

Rosenbleuth, G. M. "The Electrical Excitability of Mammalian Striated Muscle," *Am. Jr. Physiol.*, 129 (April 1940) 22–37.

Scott, J. C., *et al.* "Climatic Effects on Cardiac Output and the Circulation in Man," *Am. Jr. Physiol.*, 129 (April 1940) 102–22.

Sichel, F. J. M., and Prosser, C. L. "Summation and the Absence of Refractory Period in Isolated Muscle Fibers," *Am. Jr. Physiol.*, 128 (Jan. 1940) 203–12.

Skinner, G. A. "Modern Wonders of the Human Machine," *Hygeia*, 18:
"Nervous System," (Jan. 1940) 46–9, 87.
"Digestive System," (Feb. 1940) 140–4, 178.
"Heart," (March 1940) 238–40, 52–3.
"Excretion," (April 1940) 329–32.
"Safety Devices," (May 1940) 429–32.
"The Skin," (June 1940), 526–8.

Stare, F. J., and Bauman, C. A. "Effect of Insulin on Muscle Respiration," *Jr. Biol. Chem.*, 133 (April 1940) 453–66.

Stuart, H. C., Hill, P., and Shaw, C. *Growth of Bone, Muscle and Overlying Tissues as Revealed by Studies of Roentgrams of the Leg Areas.* (Washington, D. C.: Nat'l Res. Council, 1940) 190 pp.

PHYSIOLOGY OF EXERCISE

Asmussen, E. "Cardiac Output in Rest and Work in Humid Heat," *Am. Jr. Physiol.*, 131 (Nov. 1940) 54–9.

Bloor, W. R. "Inheritance Effect of Exercise on the Phosphilipid and Choles-

terol Content of Muscle," *Jr. Biol. Chem.*, 132 (Jan. 1940) 77–82.

Brown, G. L., and Harvey, A. M. "Effect of Changes in Dietary Calcium on Neuro-Muscular Transmission," *Jr. Physiol.*, 97 (Jan. 1940) 330–7.

Elftman, H. "Work Done by Muscles in Running," *Am. Jr. Physiol.*, 129 (June 1940) 672–84.

Flock, E. V., and Bollman, E. B. "Resynthesis of Muscle Glycogen after Exercise," *Jr. Biol. Chem.*, 136 (Nov. 1940) 469–78.

Freeman, G. L., and Kendall, W. E. "Effect upon Reaction Time of Muscular Tension Induced at Various Preparatory Levels," *Jr. Exper. Psychol.*, 27 (Aug. 1940) 136–48.

Holloway, T. F. "An Electrocardiographic Study of College Athletes," grad. thesis, New York University, 1940.

Hunt, T. *Exercise and Keep Fit.* (New York: Prentice-Hall, 1940) 202 pp., $2.00.

Schneider, E. C., and Crampton, C. B. "Comparison of Some Respiratory Reactions of Athletes and Non-Athletes," *Am. Jr. Physiol.*, 129 (April 1940) 165–70.

Seltzer, C. C. "Body Build and Oxygen Metabolism at Rest and During Exercise," *Am. Jr. Physiol.*, 129 (April 1940) 1–12.

Tussing, L. "Effects of Football on Vision," RES. QUAR., 11 (March 1940) 16–8.

Tuttle, W. W., and Walker, F. H. "Effect of a Season of Training and Competition on the Response of the Hearts of High School Boys," RES. QUAR., 11 (Dec. 1940) 78–81.

PHYSIOTHERAPY

Buck, C. A. "Rehabilitation of the Mentally Ill," *Can. Pub. Health Jr.*, 31 (Feb. 1940) 62–7.

Canty, A. "Case Study Method of Rehabilitating Drivers," *Jr. Soc. Psychol.*, 12 (Dec. 1940) 271–8.

Fantus, B., and Sloan, L. H. (eds.) *Yearbook of General Therapeutics.* (Chicago: Yearbook Pub. Co., 1940) 532 pp., $2.50.

Fifield, E. G. "Physiotherapy Program in a School for Crippled Children," *Jr. Health & Phys. Ed.*, 11 (Sept. 1940) 419, 442–4.

Henry, M. "Help Wanted," *Hygeia*, 18 (Oct. 1940) 870–3, 934.

Jeliffe, S. E. *Sketches in Psychosomatic Medicine.* (Chicago: Nervous and Mental Disease Monog., 1939) 155 pp., $3.00.

Kovacs, R. *Physical Therapy for Nurses.* (Philadelphia: Lea, 1940) 335 pp., $3.25.

——— (ed.) *Yearbook of Physical Therapy.* (Chicago: Yearbook Pub. Co., 1940) 414 pp., $2.50.

Neustadt, E. "Occupational Therapy and Current Educational Trends," *Jr. Health & Phys. Ed.*, 11 (Feb. 1940) 74–8, 126–7.

PLAY, RECREATION, LEISURE

Barse, M. E. S. *Games for All Occasions.* (New York: Grosset, 1940) 247 pp., $0.50.

Bell, L. P. *Successful Parties.* (New York: Revell, 1940) 220 pp., $1.50.

Butler, G. D. *Introduction to Community Recreation.* (New York: McGraw-Hill, 1940) 547 pp., $3.50.

"Child Development through Play and Recreation," *Recreation*, 33 (Feb. 1940) 625–7, 643–4.

Clark, K. (ed.) *What Can We Do That's New?* (Indianapolis: Drake, 1940) 77 pp., $1.00.

Conger, R. M. "Plan for a College Recreation Program," *Jr. Health & Phys. Ed.*, 11 (Feb. 1940) 88–9, 116–7.

Daniels, A. S. "Report on National Survey of Student Recreation in Colleges and Universities," RES. QUAR., 11 (Oct. 1930) 38–54.

Diehl, L. J., *et al. Industrial Recreation: Its Development and Present Status.* (Lafayette, Ind.: Purdue Univ., 1940) 75 pp.

Dulles, F. R. *America Learns to Play.* (New York: Appleton-Century, 1940) 441 pp., $4.00.

Erikson, E. H. "Studies in the Interpretation of Play," *Genet. Psychol. Monographs*, 22 (Nov. 1940) 557–671.

Gloss, G. M. "Bibliography of Master's Theses and Doctoral Studies in the Field of Recreation," RES. QUAR., 11 (March 1940) 150-63.

——— "Research in Recreation," *Recreation,* 33 (March 1940) 651-3.

Greenbie, S. *Leisure for Living.* (New York: G. Stewart, 1940) 228 pp., $2.50.

Harbin, E. O. *Fun Encyclopedia.* (Nashville: Cokesbury Press, 1940) 1008 pp., $2.75.

Halsey, E. *Development of Public Recreation in Metropolitan Chicago.* (Chicago: Recr. Com., City Hall, 1940) 88 pp., $2.00.

Hjelte, G. *Administration of Public Recreation.* (New York: Macmillan, 1940) 416 pp., $3.00.

Irwin, W. I. "Pupil Adjustment through Recreation Activities," *Recreation,* 34 (Oct. 1940) 423-5.

Jack, H. A. "Schools of the Out-of-Doors," *Recreation,* 34 (April 1940) 20-2, 55.

Kirkus, V. *House for the Week Ends.* (Boston: Little, 1940) 252 pp., $2.50.

Lipovetz, F. J. *Recreation: Handbook of Playground, School and Adult Recreation.* (Minneapolis: Burgess, 1940) 399 pp., $4.00.

Marran, R. J. *Games Outdoors.* (New York: Crowell, 1940) 212 pp., $2.00.

McClow, L. L., *et al. Play Gymnastics.* (New York: Crofts, 1940) 153 pp., $3.00.

McNutt, P. V. "Recreation and the National Morale," *Recreation,* 33 (Jan. 1940) 543-6, 583-4.

——— *Playthings for Indoor and Outdoor Fun:* (New York: Appleton-Century, 1940) 163 pp., $2.00.

Meyer, J. S. *Big Fun Book.* (New York: Greenburg, 1940) 800 pp., $2.00.

——— *More Fun for the Family.* (New York: Garden City Pub. Co., 1940) 319 pp., $1.00.

Nordly, C. L. "The Survey in the Development of a Community Recreation Program," RES. QUAR., 11 (Dec. 1940) 20-5.

Pangburn, W. W. "Play and Recreation," *The Annals,* 212 (Nov. 1940) 121-9.

Proceedings, 25th National Recreation Congress (New York: Nat'l Rec. Ass'n, 1940) 197 pp., $1.00.

Ringe, I. "Recreation for Children in a Democracy," *Recreation,* 33 (Jan. 1940) 553-6, 585-7.

"Should Recreation Supported by Public Funds be Administered as a Part of Public Education?" *Sch. Life,* 25 (May, 1940).
    Light, N. S. (affirmative) 240.
    Brown, V. K. (negative) 241-2.

Spicer, D. G. *Parties for Young Americans.* (New York: Woman's Press, 1940) $1.00.

Tweedsmuir, (Lord). "Man and His Leisure," *Recreation,* 34 (Oct. 1940) 407-9.

Vinal, W. G. *Nature Recreation: Group Guidance for the Out-of-Doors.* (New York: McGraw, 1940) 322 pp., $3.00.

Weinberg, H. M. "The Place of a Hobby Program in the Department of Public Recreation," *Recreation,* 33 (March 1940) 671-4, 701.

Wheeler, L. R. "Adapting Play to the Curriculum," *Education,* 61 (Oct. 1940) 115-22.

POSTURE

Hayes, W. E. "Posture in Education," *Jr. Health & Phys. Ed.,* 11 (Jan. 1940) 16-7.

Lowman, C. L. "Feet and Body Mechanics," *Jr. Health & Phys. Ed.,* 11 (March 1940) 137-8, 192-3.

Soley, M. H., and Shock, N. W. "Rate of Respiratory Adjustment to Postural Change," *Am. Jr. Physiol.,* 130 (Oct. 1940) 771-6.

PROGRAMS, CURRICULA, SYLLABI

Bartlett, F. *Games, Dances, and Activities for Physical Education,* (New York: Noble, 1940) 168 pp., $2.00.

Blanchard, V., and Collins, L. B. *A Modern Physical Education Program for Boys and Girls.* (New York: Barnes, 1940) 250 pp., $2.00.

Carter, J. J. "Certain Features of a De-

veloping City School Health Education Program," *Education*, 60 (April 1940) 483–8.

Clarke, H. H. *Application of Measurements in Physical Education Programs in Secondary Schools*. (Syracuse, N. Y.: Syracuse Univ., 1940) 331 pp.

——— "Developing Physical Fitness Programs in Small Schools," *Education*, 60 (April 1940) 472–8.

Curtiss, L. B. "A Critical Evaluation of the Physical Education Program of the Rural Schools of Michigan," Res. Quar., 11 (March 1940) 121–9.

Dearborn, T. H. *Check List for the Survey of Health and Physical Education Programs in Secondary Schools*. (Stanford University, Cal.: Stanford Univ. Press, 1940) 23 pp., $0.60.

Farber, I. D. "An Intramural Program Sponsored by a Technical High School," *Ath. Jr.*, 20 (June 1940) 11–3.

Geiges, E. A. "Team Coaching Procedures as Models for Ability Grouping and Individualization on the Physical Education Program," *Ath. Jr.*, 20 (March 1940) 32–4.

Haislet, E. L. (ed.) "Noon Hour Fun," *Recreation*, 33 (March 1940) 655–9.

Irwin, L. W., and Reavis, W. C. "Practices Pertaining to Health and Physical Education in Secondary Schools," Res. Quar., 11 (Oct. 1940) 93–109.

LaPorte, W. R. (comp.) *The Physical Education Curriculum*. (Los Angeles: Univ. So. Cal. Press, 1940) $1.00.

Mcknight, O. B. "Presenting Physical Education Programs to Communities," *Education*, 60 (April 1940) 507–9.

"New Emphasis for Playground Nature Programs," *Recreation*, 34 (April 1940) 14–6.

Oberteuffer, D., *et al. Health Activities and Problems: an Experience Workbook for the Secondary School Student*. (Boston: Houghton, 1940) 147 pp., $0.60.

Olsen, W. A. "The Athletic Coach in the Community Recreation Program," *Ath. Jr.*, 20 (June 1940) 9, 42.

Oxley, H. W. "Camp Life as a Basis for Program Planning; Civilian Conservation Corps," *Sch. Life*, 26 (Nov. 1940) 56–7.

Rice, C. L. "Health Program in the Canal Zone Secondary Schools," *Sch. & Soc'y*, 51 (June 1, 1940) 715–7.

Roth, M. "An Intramural Noon-Hour Program," *Ath. Jr.*, 20 (June 1940) 43–5.

Staley, S. C. *The Curriculum in Sports*. (Champaign, Ill.: Stipes Pub. Co., 1940) 373 pp., 2.50.

RELATIONSHIPS

Caswell, J. E. "Relationship of Health Examination Records to Selected School Records," grad. thesis, University of Michigan, 1940.

DiGiovanna, V. "Relation of Selected Structural and Functional Measures to Success in College Athletics," grad. thesis, New York University, 1940.

Espenschade, A. *Motor Performance, Including Study of Relationships with Measures of Physical Measures and Maturity*. (Washington, D. C.: Nat'l. Res. Council, 1940) 126 pp.

Freeman, G. L. "Relationship between Performance Level and Bodily Activity," *Jr. Exper. Psychol.*, 26 (June 1940) 602–28.

Giauque, C. D. "Study of Relationships among Health, Strength, and Certain Traits of Character," grad. thesis, New York University, 1940.

Hertzler, A. E. *The Doctor and His Patients*. (New York: Harper, 1940) 316 pp., $2.40.

Hyman, H. T. "The Emotions and Disease," *Hygeia*, 18 (Aug. 1940) 683–4. 749.

Kirkpatrick, T. B. "The Physical Education Teacher as Health Counselor," *Jr.-Lancet*, 60 (Oct. 1940) 451–2.

MacCracken, H. N. "Recreation and Better Human Relations," *Recreation*, 34 (Nov. 1940) 463–6, 505.

Metfessel, M. "Relationship of Heredity and Environment in Behavior," *Jr. Psychol.*, 10 (July 1940) 177–98.

Middleton, W. C., and Moffett, D. C. "Relation of Height and Weight Measurements to Intelligence and to Dominance-Submission among a Group of College Freshman," Res. Quar., 11 (Dec. 1940) 53–9.

Miller, A. H. "Brief Study of Nutritional Status in Relation to Strength and Skill," RES. QUAR., 11 (Oct. 1940) 66–74.

Ray, H. C. "Inter-relationships of Physical and Mental Abilities and Achievements of High School Boys," RES. QUAR., 11 (March 1940) 129–41.

Rugen, M. E. "The Physical Education Teacher's Responsibility for Health Instruction," *Jr.-Lancet,* 60 (Aug. 1940) 371–3.

Shepard, C. E. "Student Health Service and Medical Practice," *Jr.-Lancet,* 60 (Feb. 1940) 70–3.

Stolz, H. R. "Teacher's Part in Treating Behavior Disorders," *Jr. Health & Phys. Ed.,* 11 (Oct. 1940) 479, 512–4.

Sundwall, J. "The American Student Health Association and the Public Health Program," *Proc. Am. Stud. Health Ass'n, 1939,* 28–30.

Webster, R. W. "Psychological and Pedagogical Factors Involved in Motor Skill Performance as Exemplified in Bowling," RES. QUAR., 11 (Dec. 1940) 42–52.

Youmans, W. B. "Bodily Strength and Mental Attitudes," *Ment. Hyg.,* 24 (April 1940) 216–28.

SAFETY, PREPAREDNESS, DEFENSE

Allen, H. "Safety in Adult Activity," grad. thesis, New York University, 1940.

American Association of School Administrators. *Eighteenth Yearbook* (safety education). (Washington, D. C.: 1201 Sixteenth St., N. W., 1940) 544 pp., $2.00.

Ausbury, T. G. "Study of Motorists and Techniques Used in Safety Education," grad. thesis, Indiana University, 1940.

Baird, C. "How to Stage a Water Safety Campaign," *Beach & Pool,* 14 (June 1940) 18.

Beadle, K. N. "What Should Be Included in a High-School Safety Program?" *Am. Sch. Board Jr.,* 100 (Feb. 1940) 35–6, 98.

Brown, H. E. "Study of Safety in Elementary and Junior High Schools of New York City," grad. thesis, New York University, 1940.

Drake, C. A. "Prediction and Control of Accidents," *Sci. Mo.,* 51 (July 1940) 74–6.

Driver Education and Training Manual. (Washington, D. C.: Am. Auto. Ass'n, 1940) 144 pp., $0.17 (school price).

Irwin, L. W. "Role of Health and Physical Education in National Defense," *Jr. Health & Phys. Ed.,* 11 (Sept. 1940) 406–7, 452–3.

Jacobson, W. "Safety versus Lawsuits," *Recreation,* 34 (May 1940) 85–91, 122.

Jones, H. "Defense Program Features, an Open Letter from Dr. Jones," *Jr. Health & Phys. Ed.,* 11 (Nov. 1940) 523–7.

Joy, B. E. "Health and Safety in Organized Camps," *Jr. Health & Phys. Ed.,* 11 (May 1940) 287–90, 330–2.

LaTourette, C. "Prevention of Injury in Softball," *Jr. Health & Phys. Ed.,* 11 (May 1940) 305, 328–9.

Leathers, W. S. "Public Health in National Defense," *Am. Jr. Pub. Health,* 30 (Nov. 1940) 1269–75.

McMurray, R. J. "Defense on the Job," *Jr. Health & Phys. Ed.,* 11 (Dec. 1940) 594–5, 642–3.

Miller, B. W. "Problems in Safety Education," *Jr. Health & Phys. Ed.,* 11 (April 1940) 225–7, 270.

Muehleck, C. W. "Curriculum in Safety Education for Oradell, N. J., Junior High School," grad. thesis, Springfield College, 1940.

"National Defense and the Cities," *Am. City,* 55 (Aug. 1940) 56.

Piper, R. A. "Trends in Athletic Safety," *Jr. Health & Phys. Ed.,* 11 (Oct. 1940) 467–9, 518.

"Plan for National Defense," *Jr. Health & Phys. Ed.,* 11 (Sept. 1940) 397–9.

"Prevention of Accidents in and about Schools," *Beach & Pool,* 14 (Aug. 1940) 14.

Price, H. D. "Safety Procedures in Gymnastics," *Ath. Jr.,* 20 (Feb. 1940) 10–2, 45–6.

Problems and Topics in Safety Instruction. (Washington, D. C.: Nat'l Ed. Ass'n, 1940) 32 pp., $0.25.

Rosenfeld, H. N. *Liability for School Accidents.* (New York: Harper, 1940) 220 pp., $2.00.

"(The) Schwert Bill—H. R. 10606," *Jr. Health & Phys. Ed.,* 11 (Nov. 1940) 528–35, 578–80.

Smith, G. J. "An Assurance Plan Providing Medical Care for Football Injuries," *Ath. Jr.,* 20 (June 1940) 38–9.

Stack, H. J. "Correlating School Safety," *Jr. Health & Phys. Ed.,* 11 (Nov. 1940) 536–9, 583.

———, *et al. Safety Every Day.* (New York: Noble, 1939) 128 pp., $0.80.

State Regulation of Safety Education in the United States. (Washington, D. C.: Am. Auto. Ass'n, 1940) $0.10.

"Taping Technique: Prevention of Injuries through Proper Taping," *Ath. Jr.,* 20 (May 1940) 34–5; (Sept. 1940) 28–9, 63–4.

Teacher Liability for Pupil Injuries. (Washington, D.C.: Nat'l. Ed. Ass'n, 1940) 24 pp., $0.25.

Tinson, J. T. D. "Safety Insurance for Swimmers," *Beach & Pool,* 14 (June 1940) 11.

Visual Aids in Safety Education. (Washington, D. C.: Nat'l Ed. Ass'n, 1940) 32 pp., $0.25.

Williams, S. J., and Charters, W. W. *Safety.* (New York: Macmillan, 1940) 451 pp., $1.60.

TEACHER TRAINING

Adams, T. *Motion Pictures in Physical Training.* (New York: Teachers College, Columbia Univ., 1939) 57 pp., $1.00.

Baker, G. M. *The Modern Teacher of Physical Education.* (New York: Crofts, 1940) 264 pp., $2.00.

Barkdoll, O. R. "Teaching Gymnastics with Home-made Aids," *Jr. Health & Phys. Ed.,* 11 (Oct. 1940) 491–3.

Best, E. M. "Trends in Teacher Education," *Jr. Health & Phys. Ed.,* 11 (Dec. 1940) 587–8, 633–4.

Bosley, H. E. "Training in Health Needed by Teachers," *Elem. Sch. Jr.,* 41 (Sept. 1940) 52–8.

Broudy, H. S. "Academic Requirements and Professional Prestige," *Sch. & Soc'y,* 51 (Jan. 6, 1940) 7–12.

Brown, M. C. "Learning Problems in Student Teaching," RES. QUAR., 11 (Dec. 1940) 25–32.

Campbell, L. E. "The Prospective Teacher and His Knowledge of Contemporary Life Affairs," RES. QUAR., 11 (Oct. 1940) 126–35.

Clapp, P. O. "Preparation for a Recreational Leadership," *Recreation,* 34 (Sept. 1940) 358–60.

Eriksen, F. B. "Teaching Procedure for the Coach of Wrestling," *Jr. Health & Phys. Ed.,* 11 (Jan. 1940) 21–4, 52.

Frazier, B. W. "Minimum Certification Requirements for Teachers," *Sch. Life,* 26 (Oct. 1940) 27–9.

Fredericks, J. W. "Weaknesses, Gaps, and Overlaps in the Professional Curriculum in Physical Education as Expressed by High School Teachers," grad. thesis, the Pennsylvania State College, 1940.

Hellebrandt, F. A. "Physiology and the Physical Educator," RES. QUAR., 11 (Oct. 1940) 12–29.

Johnson, K. L. "Teacher Training Program of Physical Education in Colleges and Universities for Negroes," grad. thesis, Springfield College, 1940, 233 pp.

Leonard, M. L. "Getting Along with Others," *Jr. Health & Phys. Ed.,* 11 (March 1940) 140–50, 188–9.

Park, W. E. "Preparation of Teachers," *Rev. Ed Res.,* 10 (June 1940) 191–8.

Stuit, D. B. "Mental and Physical Health of Teachers and Administrative Adjustments," *Rev. Ed. Res.,* 10 (June 1940) 224–7.

Yavits, I. "Equalizing Opponents in a Teacher-Training School," *Education,* 60 (April 1940) 524–5.

TESTS AND MEASUREMENTS

Bailey, G. C. "Significance of Muscle Strength in Body Mechanics," *Education,* 60 (April 1940) 510–2.

Barr, A. E. "Growing Complexity of Measurements," *Jr. Ed. Res.,* 33 (May 1940) 710–1.

Becker, R. F., and Glick, H. N. "An Adaptation of the Smedley Hand Dynamometer in Measuring Voluntary Fatigue, *Jr. Exper. Psychol.,* 27 (Oct. 1940) 453–67.

Burpee, R. H. *Seven Quickly Administered Tests of Physical Capacity.* (New York: Teachers College, Columbia Univ., 1940) 151 pp., $1.85.

Burr, W. P. "Development of a Classification Test of Basketball," grad. thesis, Springfield College, 1940, 117 pp.

Carl, G. P. "A New Performance Test for Adults and Older Children: the Carl Hollow Square Scale," *Jr. Psychol.*, 7 (Jan. 1940) 179–99.

Carpenter, A. "Short Cuts in Working Out Intercorrelations," RES. QUAR., 11 (Oct. 1940) 32–7.

Cozens, F. W. "Strength Tests as Measures of General Athletic Ability in College Men," RES. QUAR., 11 (March 1940) 45–52.

Crist, A. L. "Measuring Student Attainment," *Am. Jr. Nurs.*, 40 (July 1940) 802–6.

Dahlberg, G. *Statistical Methods for Medical and Biological Students.* (New York: Interscience, 1940) 232 pp., $2.75.

Etheredge, M. L., and Judah, L. N. "A Study of Age, Weight and Height of Entering Freshmen at the University of Illinois," RES. QUAR., 11 (March 1940) 142–3.

Gates, D. D., and Sheffield, R. P. "Tests of Change of Direction as Measurements of Different Kinds of Motor Ability in Boys of the Seventh, Eighth, and Ninth Grades," RES. QUAR., 11 (Oct. 1940) 136–47.

Gerling, C. J. *Short Stature and Height Increase.* (New York: Harvest, 1939) 149 pp., $2.00.

Godfrey, E. "The PFI in a Private Boys' School," *Education,* 60 (April 1940) 491–4.

Good, C. V. "Selected Bibliography on Methodology of Educational Research and Related Problems," *Jr. Ed. Res.*, 34 (Sept. 1940) 57–80.

Gutteridge, M. V. *Study of Motor Achievement of Young Children.* (*Archiv. Psychol., 1939*) 178 pp., $1.75.

Herring, J. P. "The Measurement of Mental Growth," *Jr. Ed. Psychol.*, 31 (Dec. 1940) 686–92.

Hinton, E. A., and Rarick, L. "Correlation of Rogers' Test of Physical Capacity and the Cubberly and Cozens Measurement of Achievement in Basketball," RES. QUAR., 11 (Oct. 1940) 58–65.

Holt, J. P. "Measurement of Venous Pressure in Man, Eliminating the Hydrostatic Factor," *Am. Jr. Physiol.*, 130 (Oct. 1940) 635–41.

Hyde, D. C. "Relationship of Scores on the McCurdy-Larson Organic Efficiency Test and Its Parts to Indices of Body Build and Performance of Springfield College Freshmen," grad. thesis, Springfield College, 1940, 94 pp.

Ilsley, M. L. "Study of Correlations of Men Students at Pomona College," RES. QUAR., 11 (March 1940) 115–20.

Jefferson, H. W. "Coefficient Performance Chart," RES. QUAR., 11 (Oct. 1940) 148–54.

Jorgenson, N. M., and Hatlestad, S. L. "Determination and Measurement of Body Build in Men and Women College Students," RES. QUAR., 11 (Dec. 1940) 60–77.

Larson, L. A. "A Factor and Validity Analysis of Strength Variables and Tests, with a Test Combination of Chinning, Dipping, and Vertical Jump," RES. QUAR., 11 (Dec. 1940) 82–96.

McCloy, C. H. "The Future of Tests and Measurements in Physical Education," *Jr. Health & Phys. Ed.*, 11 (Jan. 1940) 12–4, 55–6.

McCurdy, J. H., and Larson, L. A. "The Validity of Circulatory-Respiratory Measures as an Index of Endurance Conditions in Swimming," RES. QUAR., 11 (Oct. 1940) 3–11.

MacDonald, E. L. "School Health Tests," *Education,* 60 (April 1940) 458–62.

Mayer, J. S., and M. G. *Statistical Mechanics.* (New York: Wiley, 1940) 496 pp., $5.50.

Mills, C. A. "Oncoming Reversal of the Human Growth Tide," *Science,* 92 (Nov. 1940) 401–2.

Murphy, M. A. "A Study of the Primary Components of Cardiovascular Tests," RES. QUAR., 11 (March 1940) 57–71.

Mursell, J. L. "Mental Testing: A Protest," *Harper's,* 180 (April 1940) 536.

Noble, M.C.S. *Practical Measurements for School Administrators.* (Scranton, Pa.: Intern'l Textbook Co., 1939) 330 pp., $2.50.

Payne, B., and Davis, R. C. "Role of Muscular Tension in Comparison of Lifted Weights," *Jr. Exper. Psychol.,* 27 (Sept. 1940) 227–42.

Peters, C. C., and Van Voorhis, W. R. *Statistical Procedures and Their Mathematical Bases.* (New York: McGraw, 1940) 516 pp., $4.50.

Pryor, H. B. *Width-Height Tables.* (Rev. ed.; Stanford Univ. Cal.: Stanford Univ. Press, 1940) 15 pp., $0.75.

Rand, W., *et al. Growth and Development of the Young Child.* (Philadelphia: Saunders, 1940) 462 pp., $2.75.

Rogers, F. R. "The Evolution of PFI Test and Programs," *Education,* 60 (April 1940) 527–40.

Sheldon, W. H., *et al. Varieties of Human Physique.* (New York: Harper's, 1940) 347 pp., $4.50.

Slater-Hammel, A. T., and Butler, L. K. "A Mechanical Recorder for Pulse-Rate Tests," RES. QUAR., 11 (March 1940) 3–8.

Sperling, A. "Comparison of the Rogers Test and the City College of New York Physical Proficiency Test as Bases for Classifying Students for Activities in Physical Education," RES. QUAR., 11 (March 1940) 144–9.

Voltmer, E. F., and Watts, T. "A Rating Scale of Player Performance in Basketball," *Jr. Health & Phys. Ed.,* 11 (Feb. 1940) 94–5, 123–5.

VITAL STATISTICS

Allen, F. P. "Utilizing Vital Statistics in the Public Health Program," *Am. Jr. Pub. Health,* 30 (June 1940) 627–30.

Densen, P. M. "Accuracy of Statements of Age on Census Records," *Am. Jr. Hyg.,* 32 (July 1940) Sec. A. 1–38.

Dorn, H. F. "Changes in Infant and Child Mortality Rates," *The Annals,* 212 (Nov. 1940) 32–7.

——— "Graphic Representation of the Age and Sex Distribution of the Population of the United States," Am. *Jr. Hyg.,* 31 (May 1940) Sec. A, 99–108.

"Effect of Sanitation on 'Causes of Death,'" *Am. City,* 55 (Aug. 1940) 11.

Myrdal, G. *Population: a Problem for Democracy.* (Cambridge: Harv. Univ. Press, 1940) 237 pp., $2.00.

Osborne, F. "Population Trends and Public Health Problems," *Am. Jr. Hyg.,* 30 (Nov. 1940) 1331–6.

Pearl, R. *Introduction to Medical Biometry and Statistics.* (Philadelphia: Saunders, 1940) 537 pp., $7.00.

Pedley, F. G. "Marriage and Mortality." *Can. Pub. Health Jr.,* 31 (Dec. 1940) 477–80.

Swarthout, H. O., and Webster, R. G. "To What Degree Are Mortality Statistics Dependable?" *Am. Jr. Pub. Health,* 30 (July 1940) 811–5.

Whelpton, P. D. "Birth Rate and Child Welfare," *The Annals,* 212 (Nov. 1940) 24–31.

WINTER SPORTS

Booth, N. "The Country Goes A-Skiing," *Hygeia,* 18 (Feb. 1940) 112–5.

Briggs, L. E. "List of Films on Skiing," *Jr. Health & Phys. Ed.,* 11 (Jan. 1940) 36–7, 55.

Elkins, F. (Comp. Ed.) *The Complete Ski Guide.* (New York: Doubleday-Doran, 1940) 286 pp., $2.50.

Ely, W. N. "Canadian Skiing," *Country Life,* 77 (Feb. 1940) 29.

Grabow, C. L. "Construction and Maintenance of Ice Skating Areas," *Recreation,* 34 (Dec. 1940) 539, 566.

Henie, S. *Wings on My Feet.* (New York: Prentice-Hall, 1940) 177 pp., $2.00.

Langly, R. F. "Technical Part of Judging Ski Jumping," *Mass. State College Winter Sports Bul.,* Nov. 20, 1940, 7 pp. (mimeo.)

Newell, E. "Handbook on Organization and Officiating" (skiing). (Amherst, Mass.: State College, 1940) 16 pp. (mimeo.)

Official Ice Hockey Rules. (New York: Am. Sports, 1940) $0.35.

Robertson, C. "Skating as a Physical Education Activity," *Jr. Health & Phys. Ed.,* 11 (Jan. 1940) 34–5, 57–8.

Severson, E. "Westward Ski," *Country Life,* 77 (Jan. 1940) 28–9, 44–5.

Skier's Guide to New England. (Boston: New Eng. Council, 1940) 85 pp., gratis.

Weed, L. A. "Snow or Straw—We Ski," *Jr. Health & Phys. Ed.*, 11 (Jan. 1940) 27–30, 52–3.

WOMEN; DRESS, EXERCISE, HEALTH

Bowman-Wilson, W., and Wilson, I. G. "Symmetrical Proportion Charts for the Adult Female Body," Res. Quar., 11 (Dec. 1940) 3–19.

Deitz, D., and Frech, B. "Hockey Knowledge Tests for Girls," *Jr. Health & Phys. Ed.*, 11 (June 1940) 366, 387–8.

Fox, H. "Debunking Cosmetics," *Hygeia*, 18 (April 1940) 300–2. 361.

Glasgow, M. *The Subjection of Woman and Traditions of Men.* (New York: McAuliffe-Booth, 1940) 341 pp., $3.00.

King, C. L. "Guarding Health in Girls' Basketball," *Jr. Health & Phys. Ed.*, 11 (Nov. 1940) 554–5, 573.

Lindhard, J. "Physical Exercises for Women," *Jr. Health & Phys. Ed.*, 11 (May 1940) 295–7, 326.

Ludlum, F. E., and Powell, E. "Chest-Height-Weight Tables for College Women," Res. Quar., 11 (Oct. 1940) 55–7.

Meissner, W., and Meyers, E. Y. *Basketball for Girls.* (New York: Barnes, 1940) 87 pp., $1.00.

Miner, N., *et al.* "Study of Distance Traversed and Time Spent in Active Play in Women's Basketball," Res. Quar., 11 (March 1940) 94–101.

Official Badminton Guide for Women. (New York: Barnes, 1940) 50 pp., $0.25.

Russell, N., and Lange, E. "Achievement Tests in Volleyball for Junior High School Girls," Res. Quar., 11 (Dec. 1940) 33–41.

Schmithals, M., and French, E. "Achievement Tests in Field Hockey for College Women," Res. Quar., 11 (Oct. 1940) 84–92.

Snavely, M. "Volleyball Skill Tests for Girls," *Jr. Health & Phys. Ed.*, 11 (Feb. 1940) 102–3.

Soccer for Women and Girls. (New York: Barnes, 1940) $0.50 (pa. $0.25).

Sprow-Howland, I. "The College Woman — Her War Strains, Peace, and Physical Fitness," *Education*, 60 (April 1940) 504–7.

Steggerda, M., and Petty, C. E. "An Anthropometric Study of Negro and White College Women," Res. Quar., 11 (Oct. 1940) 110–8.

Sumption, D. *Sports for Women.* (New York: Prentice-Hall, 1940) 264 pp., $2.50.

MISCELLANEOUS

Affleck, G. B. (Comp.) "Selected Bibliography for 1939," Res. Quar., 11 (Dec. 1940) 135–69.

American Youth Hostels. *AYH Handbook, 1940.* (Northfield, Mass.: Am. Youth Hostels, Inc., 1940) $0.50.

Barr, D. P. (ed.) *Modern Medical Therapy in General Practice*, (New York: Wood, 1940) 3 vol., $35.00.

Beard, D. C. *Dan Beard Talks to Scouts* (photographic record). (New York: Garden City Pub. Co., 1940) $1.25.

Beise, D. "Comparative Analysis of the Physical Education Background, Interests, and Desires of College Students as an Evaluation Procedure," Res. Quar., 11 (Dec. 1940) 120–34.

Boyd, M. F. *Preventive Medicine.* (6th. ed.; Philadelphia: Saunders, 1940) 588 pp., $5.00.

Brace, D. K. "Selected References: Health and Physical Education in Elementary Schools," *Elem. Sch. Jr.*, 41 (Nov. 1940) 224–5.

Cabot, H. *The Patient's Dilemma.* (New York: Reynal & Hitchcock, 1940) 284 pp., $2.50.

Jones, T. D. *Development of Certain Motor Skills and Play Activities in Young Children.* (New York: Teachers College, 1939) 180 pp., $1.85.

McKellar, A. P. "A Twenty-Four Hour Activity Study of High School Children in Massachusetts," *The Commonwealth* (Bul. Mass. Dept. Pub. Health.) 27 (July-Dec. 1940) 61–71.

Medical Care in the United States: Demand and Supply in 1939. (Chicago: Am. Med. Ass'n, 1940) 140 pp., $1.00.

Miller, E. *Neuroses in War.* (New York: Macmillan, 1940) 250 pp., $2.50.

Simms, H. S. "Physiological Alterations as the Cause of Senile Debility and Senile Mortality," *Science,* 91 (Jan. 5, 1940) 7–9.

Stix, T. L. *The Sporting Gesture.* (New York: Appleton-Century, 1940) 276 pp., $1.00 (student edition).

"What Are the Helpful Books on Health and Physical Education?" *Prog. Ed.,* 17 (April 1940) 282–3.

Index for Volume XII (1941)

Cumulative Author, Subject Matter, and Title

Numbers refer to: First—number of issue; second—page number; "s"—supplement. Pages throughout the volume are numbered consecutively.

Number 1 is March; number 2, May and supplement; number 3, October and supplement; number 4, December.

For example, 2s:416 refers to May supplement, page 416.

BOOK REVIEWS

BASEBALL REGISTER. J. G. Taylor Spink, comp. (St. Louis: C. C. Spink and Son, 1941) 256 pages, illustrated, paper $1.00, cloth $2.00.

Here is a book that is a perfect gold mine of information, filling a definite need in the sports reference field. In one book are contained the essential facts about the lives and careers of baseball's "400." The full name of the player, his nickname and how acquired, a sample of his autograph, what team he plays with, essential vital statistics and physical description, education, nationality, when and to whom he was married, hobbies, and outstanding accomplishments are all given. Then follows a tabulation of his playing record both as major and minor league player and including World Series and All-Star games, if any.

The book is divided into four sections: History of Baseball, Cooperstown Museum and Players in Hall of Fame; Modern Stars; Managers and Coaches; Former Stars. The section on the history of baseball, the Cooperstown museum and the Hall of Fame is of particular usefulness and is well illustrated. By and large the selection of names has been well done. If there is a weakness it is in the section pertaining to former stars, but here time makes such a difference in perspective worth of individual players that it is difficult to draw a hard and fast rule. Mr. Spink, we think, has done a good job. The information that is given, so far as we could see from a cursory examination, is reliable in nearly all cases, a rather unusual thing in sports books of this kind. Some minor discrepancies were noticed.

Comparing the 1940 and the 1941 editions of *Baseball Register*, we find that the former has 399 names and the latter 404. However, a check of the letters A, B, and C shows that the 1940 book has a total of eighty-three names and the 1941 has only seventy-nine. Fifty-six names appear in both editions; 27 were in 1940 but not in 1941, while 23 were in 1941 but not the earlier edition. From this it would appear that the 1940 edition is still of considerable value. The largest turnover, oddly enough, is in the former stars. Pop Anson, whose playing days ended forty odd years ago, was omitted from the 1940 book but is included in the 1941 edition. Mickey Cochrane rated the previous edition but is dropped in the newer one. Altogether, in the letters A, B, and C, thirteen former stars who appear in the 1940 edition have been dropped in 1941. In their places, in addition to Anson, are added Dennis Brouthers and Jesse Burkett, both of whom finished their playing days more than thirty-five years ago.

The *Baseball Register* differs from *Who's Who in the Major Leagues* in the manner in which the material is handled, the former giving the data in tabulation form while the latter has it written out and is less detailed. As far as coverage is concerned, the *Baseball Register* includes more of the older stars, while the *Who's Who* enters some of the lesser known present day major league players and also includes owners, umpires, and sports writers as well as rosters of the major league teams. Both carry illustrations.

The chief drawback of the *Baseball Register*, as is the case of so many sports reference books, is its inadequate indexing. True, there is an Index of Records, but it is no more than a table of contents and it is necessary to know in which category the person belongs in order to find him. It is as easy to

use the text itself for this. A better way would have been to have an alphabetically arranged index, all names in one alphabet. Illustrations and the various special tables could likewise be included in the index.

WILSON M. RANCK
Ass't Reference Librarian
Hackley Public Library
Muskegon, Michigan

LEARNING TO RIDE. Captain Piero Santini. (New York: Greenburg, 1941) 206 pages, illustrated, $2.50.

Captain Santini's third book, just published, outlines both the learning and teaching of the forward seat which Santini has advocated in his two previous books, *Riding Reflections* and *The Forward Impulse.*

Learning to Ride, like the earlier books, is clearly written and easy to understand. It includes some excellent photographs of jumping, but the diagrams were unfortunately not carefully corrected. Figure 4, on page 15, is printed upside down (this no doubt will be corrected in future editions), the drawing of the jump standards, both in perspective and detail, is not of the Captain's usual mechanical exactness. Some of the statements are contrary to traditional practices, such as the fact that it is more important to stress posting on both diagonals than cantering on the correct leads, and that a jointed mouth Pelham is better than one with either port or mullen mouth. The instruction is inclined to be elementary and lacking in detail. No explanation is given of collection, flexions, changing leads, pivoting, and side-stepping. Captain Santini does not approve of such phases of horsemanship and evidently assumes that the student will be equally biased and not wish to learn such details.

The first part of the book, "Learning to Ride," explains briefly the tack required, how to mount and dismount, how to use the hands and legs, leads and diagonals, gaits and paces, the Cavalletti, jumping, suppling, and relaxing. It emphasizes the importance of controlling reflexes and developing muscular control.

The second part, entitled "Instructing and the Instructor," describes the facilities required for teaching, methods of teaching, and organizing a class.

The ring advocated should have no markers and a fence only at the four corners. This is desirable to teach the riders to control their horses but might prove hazardous during the process of learning unless the horses were exceptionally well disciplined and the riders had ability. The value of up- and downhill work and banks as preparation for cross country riding is well explained. The advantages of jumping without wings are given. The procedure advocated for lessons would require adjustment according to the judgment of the reader in order to be safe and practical for the average rider and horse at school or camp. The suggestions offered lack order and completeness.

The third part of the book and the Appendix offer suggestions for the improvement of horsemanship tests and methods of judging and giving rewards. These could in many cases be used with advantage over the present method. Particularly the statement that "the merits of competitors should not be gauged on their proficiency in relation to each other but as compared to an ideal standard the judges have set themselves." This system we have used for several years, and found it successful. Its soundness will appeal to educators.

We would recommend the book to anyone who, with previous experience teaching riding, is interested in methods of teaching the forward seat in its simplest form.

PHYLLIS LININGTON
Miss Linington's Stable
Milton, Massachusetts

The RESEARCH QUARTERLY

PUBLISHED BY THE AMERICAN ASSOCIATION FOR HEALTH, PHYSICAL EDUCATION, AND RECREATION

DEC., 1941

VOLUME 12

NUMBER 4

Entered as second class matter March 22, 1930, at the Post Office at Ann Arbor, Michigan, under the act of March 3, 1879.

REPRINTS

from past issues of the Research Quarterly

Q 261	A Study of the Social Values of a Team Game and of Two Individual Sports as Judged by the Attitudes of Freshman College Women, *Haselton*	.10
Q 262	Intramural Athletics for Men in Negro Colleges, *Taylor*	.10
Q 263	A Study of Response Time Before and After Strenuous Exercise, *Elbel.*	.10
Q 264	Review of a Decade of Research in Aquatics at Springfield, 1929–39, *Cureton*	.10
Q 265	Physiology and the Physical Educator, *Hellebrandt*	.15
Q 266	The Validity of Circulatory-Respiratory Measures As An Index of Endurance Condition in Swimming, *McCurdy and Larson*	.10
Q 267	Coefficient Performance Chart, *Jefferson*	.10
Q 268	Chest-Height-Weight Tables for College Women, *Powell and Ludlum*...	.10
Q 269	Short Cuts in Working Out Intercorrelations, *Carpenter*	.10
Q 270	An Anthropometric Study of Negro and White College Women, *Steggerda and Petty*	.10
Q 271	Hypersensitiveness to Cold: A Condition Dangerous to Swimmers, *Horton and Gabrielson*	.10
Q 272	Practices Pertaining to Health and Physical Education in Secondary Schools, *Irwin and Reavis*	.10
Q 273	Report on National Survey of Student Recreation in Colleges and Universities, *Daniels*	.15
Q 274	Learning Problems in Student Teaching, *Brown*	.10
Q 275	The Philosophical or Group Thinking Method of Research, *Cureton*....	.10
Q 276	Psychological and Pedagogical Factors Involved in Motor Skill Performance as Exemplified in Bowling, *Webster*	.10
Q 277	The Determination and Measurement of Body Build in Men and Women College Students, *Jorgensen and Hatlestad*	.10
Q 278	Symmetrical Proportion Charts for the Adult Female Body, *Bowman-Wilson and Wilson*	.10
Q 279	A Comparative Analysis of the Physical Education Background, Interests, and Desires of College Students as an Evaluation Procedure, *Beise*	.10
Q 280	The Effect of a Season of Training and Competition on the Response of the Hearts of High School Boys, *Tuttle and Walker*	.10
Q 281	A Factor and Validity Analysis of Strength Variables and Tests with a Test Combination of Chinning, Dipping, and Vertical Jump, *Larson*....	.10
Q 282	The Relation of Height and Weight Measurements to Intelligence and to Dominance-Submission Among a Group of College Freshmen, *Middleton and Moffett*	.10
Q 283	Effect of Gelatin on the Work Output of Male Athletes and Non-Athletes and Girl Subjects, *Kaczmarek*	.10

Order by number from

American Association for Health, Physical Education, and Recreation
1201 Sixteenth St., Northwest Washington, D. C.

Life and Honorary Members

American Association for Health, Physical Education, and Recreation

Ainsworth, Dorothy, 15 Barrett Place, Northampton, Mass.

*Anderson, W. G., Box 1911, Yale Station, New Haven, Connecticut.

Bell, Margaret, University of Michigan, Ann Arbor, Michigan.

Bookwalter, Karl W., Indiana University, Bloomington.

*Day, William E., 1377 Princeton Ave., Salt Lake City, Utah.

Delta Theta Epsilon, University of Illinois, Urbana, Illinois.

Dupain, George Z., Rose Bank, 158 Parramatta Road, Ashfield, N.S.W., Australia.

Elliott, E. S., Columbia University, New York City.

Gates, Grover, 835 Hampton Way, Fresno, California.

Giauque, C. D., George Williams College, Chicago, Ill.

*Hillyer, J. Blake, 145 Henry St., Brooklyn, New York.

Houston, Ruth, State Teachers College, Buffalo, New York.

Langton, Clair V., Oregon State Agricultural College, Corvallis, Oregon.

Lee, Mabel, University of Nebraska, Lincoln, Nebraska.

Luehring, F. W., 435 Riverview Rd., Swarthmore, Pa.

McCloy, C. H., State University of Iowa, Iowa City.

McKinstry, Helen, Russell Sage College, Troy, New York.

Metcalf, T. N., University of Chicago, Ill.

Miller, Ben W., Indiana University, Bloomington, Ind.

Mitchell, E. D., University of Michigan, Ann Arbor, Michigan.

Moore, Rodgers, P.O. Box 911, Visalia, Calif.

Moorhead, W. G., 121 Center Street, East Stroudsburg, Pa.

Moulton, Gertrude E., 291 Forest Ave., Oberlin, Ohio.

Neilson, N. P., 1201 Sixteenth St., N. W., Washington, D.C.

Norris, J. Anna, 1429 East River Road, Minneapolis, Minn.

Noyes, Elizabeth, 1201 16th St., N.W., Washington, D.C.

Panzer College of Physical Education and Hygiene, 139 Glenwood Ave., East Orange, New Jersey.

Pratt, John Barnes, 67 W. 44th St., New York City.

Rugen, Mabel, University of Michigan, Ann Arbor.

Schnell, H. W., University of North Carolina, Chapel Hill.

Siler, J. Granville, 2574 Hilgard Avenue, Berkeley, Calif.

Sparks, Leslie J., Willamette Univ., Salem, Oregon.

Stafford, Grace M., N.Y.A., 505 Merchandise Mart, Chicago, Ill.

*Stecher, William A., 1510 Darby Road, Upper Darby, Pennsylvania.

Steinhaus, Arthur H., George Williams College, Chicago, Ill.

Streit, William K., Board of Education, Cincinnati, Ohio.

Swain, Leslie E., Brown University, Providence, Rhode Island.

---

*Honorary Members

Bloom-

chigan,

Calif.
East

Ave.,

N. W.,

Road,

N.W.,

and
Orange,

New

Ann

arolina,

avenue,

Salem,

assachu-

Upper

Cal-

Chi-

Presi-